MAR 20 1987

COMPLETED

233-N

192

TD 11.25: 986

U.S. Department of Transportation
Maritime Administration

Report on Survey of U.S. Shipbuilding and Repair Facilities

1986

ORIGINAL

Serial

serial
TD 11.25:

BEST COPY AVAILABLE

REPORT ON SURVEY OF U.S.
SHIPBUILDING AND REPAIR FACILITIES
1986

Prepared By:

Office of Shipbuilding Costs and Production

Division of Production

December 1986

CONTENTS

PAGE

- Introduction 1
- General 2
- Major Shipbuilding Facilities 3
  - ADDSCO Industries, Inc 5
  - Avondale Industries, Inc 6
  - Bath Iron Works Corporation 8
  - Bay Shipbuilding Corporation 10
  - Bethlehem Steel Corporation - Beaumont Yard 12
  - Bethlehem Steel Corporation - Sparrows Point Yard 13
  - Fraser Shipyards, Inc 15
  - General Dynamics Corporation - Electric Boat Division 16
  - Ingalls Shipbuilding Division/Litton Systems, Inc 16
  - Lockheed Shipbuilding Company 18
  - Marathon LeTourneau Company - Gulf Marine Division 20
  - Marine Power and Equipment Co., Inc 21
  - National Steel and Shipbuilding Company 22
  - Newport News Shipbuilding and Drydock Company 24
  - Norfolk Shipbuilding and Drydock Corporation 26
  - Pennsylvania Shipbuilding Company 27
  - Portland Ship Repair Yard 30
  - Robert E. Derecktor of Rhode Island, Inc 31
  - Tacoma Boatbuilding Company 33
  - Tampa Shipyards, Inc 34
  - Todd Shipyards Corporation - Galveston Division 36
  - Todd Pacific Shipyards Corporation - Los Angeles Division 38

PAGE

Todd Shipyards Corporation - San Francisco Division................ 40

Todd Pacific Shipyards Corporation - Seattle Division.............. 41

Toledo Shipyard, The... 43

Employment... 44

Ship Repair Facilities... 44

Repair (with Drydocking) Facilities................................ 48

Major Topside Repair Facilities.................................... 48

Active Shipbuilding Base... 49

Exhibit 1 - Shipbuilding Industry in the United States (Map)........... 51

Exhibit 2 - ADDSCO Industries - Yard Plan.............................. 52

Exhibit 3 - Avondale Industries - Yard Plan............................ 53

Exhibit 4 - Bath Iron Works Corporation - Yard Plan.................... 54

Exhibit 5 - Bath Iron Works Corporation - Portland Yard Plan........... 55

Exhibit 6 - Bay Shipbuilding - Yard Plan............................... 56

Exhibit 7 - Bethlehem, Beaumont - Yard Plan............................ 57

Exhibit 8 - Bethlehem, Sparrows Point - Yard Plan...................... 58

Exhibit 9 - Fraser Shipyards - Yard Plan............................... 59

Exhibit 10 - Ingalls/Litton (East Bank) - Yard Plan.................... 60

Exhibit 11 - Ingalls/Litton (West Bank) - Yard Plan.................... 61

Exhibit 12 - Lockheed (Plant 1) - Yard Plan............................ 62

Exhibit 13 - Lockheed (Plant 2) - Yard Plan............................ 63

Exhibit 14 - Marathon, Gulf Marine Division - Yard Plan................ 64

Exhibit 15 - Marine Power & Equipment - Yard 4 Plan.................... 65

Exhibit 16 - National Steel and Shipbuilding - Yard Plan............... 66

Exhibit 17 - Newport News (South Yard) - Yard Plan..................... 67

Exhibit 18 - Newport News (North Yard) - Yard Plan..................... 68

PAGE

Exhibit 19 - Norfolk Shipbuilding (Berkley Plant) - Yard Plan.......... 69

Exhibit 20 - Pennsylvania Shipbuilding Company - Yard Plan............ 70

Exhibit 21 - Portland Ship Repair Yard - Yard Plan..................... 71

Exhibit 22 - Robert E. Derecktor - Yard Plan........................... 72

Exhibit 23 - Tacoma Boatbuilding (Yards 1 and 2) - Yard Plan........... 73

Exhibit 24 - Tacoma Boatbuilding (Yards 3 and 4) - Yard Plan........... 74

Exhibit 25 - Tampa Shipyards - Yard Plan............................... 75

Exhibit 26 - Todd, Galveston Division - Yard Plan...................... 76

Exhibit 27 - Todd, Los Angeles Division - Yard Plan.................... 77

Exhibit 28 - Todd, San Francisco Division - Yard Plan.................. 78

Exhibit 29 - Todd, Seattle Division - Yard Plan........................ 79

Exhibit 30 - Toledo Shipyard, The - Yard Plan.......................... 80

Exhibit 31 - Merchant Vessels Building or on Order (As of January 1)... 81

Exhibit 32 - Major U.S. Private Shipyards - Number of Shipways by Maximum Length Capability................................ 82

Exhibit 33 - Active Shipbuilding Base (Map)............................ 83

Exhibit 34 - Shipbuilding Industry Workload Projection................. 84

Table 1 - Ship Construction Capability by Ship Type.................... 85

Table 2 - Major U.S. Private Shipyards - Number of Shipbuilding Ways by Length... 97

Appendix A - Standard Form 17 - Facilities Available for the Construction or Repair of Ships........................... 100

Appendix B - Major U.S. Shipbuilding, Repair, and Topside Repair Facilities... 109

BEST COPY AVAILABLE

Introduction

In compliance with the Merchant Marine Act of 1936, as amended, 1/ the Maritime Administration (MARAD) conducts an annual survey to obtain information from the shipbuilding and ship repair industry to be used primarily to determine if an adequate mobilization base exists for national defense and for use in a national emergency. This report on the 1986 survey of U.S. shipyard facilities was prepared by the Division of Production, Office of Shipbuilding Costs and Production, and is for general use within the Maritime Administration and other Government agencies.

1/ Section 210

"It shall be the duty of the Secretary of Transportation to make a survey of the American merchant marine, as it now exists, to determine what additions and replacements are required to carry forward the national policy declared in Section 101 of the Act, and the Secretary of Transportation is directed to study, perfect, and adopt a long-range program for replacements and additions to the American merchant marine so that as soon as practicable the following objectives may be accomplished: ...Fourth, the creation and maintenance of efficient shipyards and repair capacity in the United States with adequate numbers of skilled personnel to provide an adequate mobilization base."

Section 211

"The Secretary of Transportation is authorized and directed to investigate, determine, and keep current records of ... (g) The number, location, and efficiency of the shipyards existing on the date of enactment of this Act or thereafter built in the United States."

Section 502(f)

"The Secretary of Transportation with the advice of and in coordination with the Secretary of the Navy, shall, at least once a year, as required for purposes of the Act, survey the existing privately-owned shipyards capable of merchant ship construction, or review available data on such shipyards if deemed adequate, to determine whether their capabilities for merchant ship construction, including facilities and skilled personnel, provide an adequate mobilization base at strategic points for purposes of national defense and national emergency."

The statistical data accumulated by the survey is a major input into the Shipyard Evaluation Analysis System Model (SEAS), a quantitative assessment of the Nation's ship construction and ship repair capability. This capability is periodically compared with Department of Defense scenarios involving various contingency attrition rates and emergency civilian shipping requirements to assess the adequacy of the shipbuilding mobilization base, including ship repair and reactivation of the Maritime Administration reserve fleet and the U.S. Navy reserve fleet.

The survey also provides a data base that is used to evaluate the feasibility of proposed shipbuilding programs. Determinations are made as to which existing shipyards might construct proposed ships consistent with ship size and delivery date requirements. The need for construction of new facilities to meet the demands of proposed shipbuilding programs can be also identified. The data gathered by the annual survey also is used extensively in MARAD responses to queries received from a variety of interests, including members of Congress, the Secretary of Transportation, the Department of Defense, the Office of Management and Budget, and other Government agencies.

Each year in late spring, Standard Form 17, "Facilities Available for the Construction or Repair of Ships," is mailed to some 350 U.S. shipyards and ship repair facilities. The survey form was developed jointly by MARAD and the Navy. A completed Form 17 represents a detailed description of a shipbuilding or ship repair facility, which is not available from any other source on a continuing and structured basis. The information requested, and available for official use, can be reviewed on a blank Form 17 shown herein as Appendix A. A graving dock characteristics summary and floating drydock characteristics summary are appended to Standard Form 17 to better identify the characteristics of the facilities.

Upon receipt of a completed Form 17 from a shipyard, MARAD forwards a copy to the Office of the Coordinator for Ship Repair and Conversion which maintains records of available facilities and capacities of various shipyards and repair plants so that the Department of Transportation and the Department of Defense can use such facilities to the best advantage in the event of national emergency. The Federal Emergency Management Agency (FEMA) also uses information obtained by this survey, as does the U.S. Coast Guard, the U.S. Army Corps of Engineers, and the Commission on Merchant Marine and Defense.

General

The annual shipyard survey of 1986 has been completed; and the following information collected has been organized and condensed in the following narratives, exhibits, and tabulations to focus attention on those elements that are most often requested from this office. Appendix B is a statistical abstract of data gathered from specific companies responding to MARAD's annual survey. It lists the Nation's major shipbuilding, ship repair, and topside repair yards sorted on a coastal basis and displays information with respect to the size and type of each building position, drydock, and berth space for vessels 400 feet (122 m) in length and over, employment, and remarks regarding principal shipyard activities.

MARAD has examined drydock data submitted by shipyards in the 1986 survey. In preparing Appendix B, the following criteria were developed to establish the maximum ship size that could be accommodated in each drydock:

> For floating drydocks, the maximum ship length is as given by the shipyards. The maximum beam was determined by allowing a two-foot (.6 m) clearance at each side between the ship and wing wall.
>
> For graving docks, the maximum ship length was determined by allowing a two-foot (.6 m) clearance at each end between the ship and the inside of the dock at the floor. The maximum beam was determined by allowing a two-foot (.6 m) clearance on each side between the ship and each side of the dock entrance at the sill.

There are several types of floating drydocks and graving docks, and under certain circumstances additional clearance would be necessary between the ship and the dock body. Permissible ship sizes requiring additional clearance may be determined by simple calculation from the above criteria.

Major Shipbuilding Facilities

A major shipbuilding facility is defined in this report as one that is open, having at least one shipbuilding position, either an inclined way, a launching platform, or a building basin, with the capability to accommodate a minimum ship size of 475 feet (145 m) length overall and a beam of 68 feet (21 m). There are presently 25 shipyards in this category, which are identified and geographically located in Exhibit 1.

Despite the continuing worldwide shipping recession, uncertain near-term future prospects, and declining commercial orderbooks, the U.S. shipbuilding and ship repair industry in FY 1986 invested over $225 million in facilities modernization and expansion and as of July 1, 1986, planned to spend at least an additional $50 million during the year ending June 30, 1987.

Since enactment of the Merchant Marine Act of 1970, the U.S. shipbuilding and ship repair industry has invested approximately $3.9 billion in plant modernization and improvements. These investments have significantly increased the capacity, capability, and productivity of the industry. With the slump in commercial ship construction, the emphasis in recent years has been on expansion of ship repair, overhaul, and conversion facilities. Exhibits 2 through 30 are general arrangement plans outlining shipbuilding and repair facilities in 24 of the major yards. Detailed descriptions of these exhibits are included in this report.

As of October 1, 1986, there were nine commercial vessels 1,000 gross tons and over under construction or on order in U.S. shipyards. This orderbook was comprised of three containerships, two large crude oil carriers, two incinerator ships, and two dredges. Four of these nine ships were being built with Federal Ship Financing Guarantees (Title XI). Exhibit 31 illustrates the overall decline since the mid-1970's in both the numbers and gross tonnage of the merchant ship orderbook in the United States.

On October 1, 1986, there were 77 major combat and auxiliary ships under construction or on order for the Navy and seven medium-endurance cutters for the Coast Guard. Also, the Navy's multibillion-dollar T-Ship program is providing much-needed near-term relief to U.S. shipbuilders, particularly to those yards which have traditionally relied on construction of new oceangoing merchant ships. (The prefix "T" designates civilian-manned Naval auxiliary ships under the control of the Military Sealift Command.) As of October 1, 1986, 13 commercial shipyards had been awarded contracts for construction of 32 new T-Ships and for major reconstruction of 27 existing merchant ships. Examples of types of vessels involved in the T-Ship program are: fast sealift ships, maritime prepositioning ships, auxiliary crane ships, hospital ships, fleet oilers, ocean surveillance ships, aviation logistics support ships, and surveying ships.

Table 1 has been prepared to answer the frequent question as to the number of shipbuilding positions available to build a complete specified ship. A single shipway or basin may have several building positions depending on the size of the ships being constructed. For example, the 1,200-foot by 192-foot (366 m by 59 m) basin at Bethlehem's Sparrows Point shipyard can accommodate one 265,000-dwt. tanker or four of the smaller 475 foot by 68-foot (145 m by 21 m) cargo ships. With the exception of the mobilization ship, the ship types listed in Table 1 are mainly those historically delivered to commercial service. The total number of building positions varies from 118 for the small cargo ship to four for a huge 265,000-dwt. tanker. Length overall and beam are given for all ships and, in addition, deadweight tonnage is indicated for the bulk carriers. An important consideration that is not addressed in Table 1 is the common shipbuilding practice of laying a keel on a building position already occupied by another ship. For example, in a 700-foot (213 m) basin, a complete 610-foot (186 m) containership and the stern section of a second ship could be constructed simultaneously. This production procedure, analyzed periodically by SEAS, maximizes the use of shipbuilding facilities, minimizes the construction period, and increases the number of ships that can be produced in a given period of time. Table 1 addresses only the number of complete ships that can be constructed simultaneously in each building position(s).

Table 2 is a somewhat different presentation of the data, meaningful to those requesting information from the annual survey. In lieu of actual ships, maximum ship length is used to determine the number of shipways or basins available. In this tabulation, the emphasis is on the number of individual facilities available and not on the number of ships that can be constructed. Again, using Sparrows Point as an example, Table 2 lists the 1,200-foot by 192-foot (366 m by 59 m) basin as one facility regardless of what type of ship is constructed in it. Table 1 indicates that there are six building positions for a ship 475 feet (145 m) LOA at Sparrows Point, whereas Table 2 indicates that the yard has three individual shipways capable of constructing a ship 475 feet (145 m) in length. Exhibit 32 is a histogram displaying the reduction in the number of available shipways as the maximum ship length increases.

Following is a brief description of 25 major U.S. commercial shipbuilding facilities capable of constructing oceangoing or Great Lakes merchant ships, with a minimum size of 475 feet by 68 feet (145 m by 21 m).

1. ADDSCO Industries, Incorporated

ADDSCO Industries, Inc., is the parent or holding company of a group of marine-related companies which were reorganized under the new name in 1984. Alabama Dry Dock and Shipbuilding Corporation, is the repair and conversion subsidiary while Alabama Maritime Corporation is the new construction facility. Prior to 1984, the shipyard was referred to as Alabama Dry Dock and Shipbuilding Company.

Both the repair and new construction facilities are located on the Tenn-Tom Waterway, across the River from Mobile, Alabama, about 30 miles from the Gulf of Mexico.

Since 1916 the yard has constructed a variety of ships (both commercial and Naval), barges and drill rigs. In recent years, the company has continued its facility improvements, mainly the upgrading and modernization of existing drydocks, piers, shops, and equipment.

In 1985, Alabama Maritime completed the deckhouse steel work for five 30,000 dwt. T-5 tankers and delivered them to Tampa Shipyards. During 1985 and 1986, Alabama Drydock and Shipbuilding Corporation was awarded several Navy conversion, overhaul, and reactivation contracts as well as a number of commercial drydocking and repair jobs.

ADDSCO Industries, Inc., and its subsidiaries operate four side-launching shipways, each of which can accommodate a maximum ship size of 523 feet by 90 feet (160 m by 27 m) and one end-launch shipway which can handle vessels as large as 620 feet by

105 feet (189 m by 32 m). There are two floating drydocks available for repair and conversion; the larger of the two can accommodate a ship size of 750 feet by 100 feet (229 m by 31 m). There is also 9,370 feet (2856 m) of berthing space at seven finger piers for topside repairs. ADDSCO Industries and its subsidiaries have 19 revolving gantry cranes with capacities up to 75 tons (67 metric tons) to service the shipways and berthing areas. A 275-ton (250 metric ton) Goliath bridge crane which straddles the slip between piers K and L is utilized for construction and outfitting.

Mobile Giant Erectors, Inc., also a nearby subsidiary of ADDSCO Industries, operates the largest capacity lifting facility on the Gulf Coast. This twin-boom luffing derrick with 300-foot (91 m) high booms and the capability of handling 1,400 metric tons at a radius of 175 feet (53 m) gives ADDSCO Industries the ability to serve the heavy construction industry and to construct the heavy offshore structures required in today's market.

At mid-1986, combined employment totaled 950 at the ADDSCO subsidiaries that handle ship construction and ship repair--Alabama Dry Dock and Shipbuilding Corporation (repair work) and Alabama Maritime Corporation (new construction).

Exhibit 2 is a current general arrangement plan of these two ADDSCO facilities.

2. Avondale Industries, Inc. - Avondale Shipyards Division

Avondale Shipyards Division is located on the west bank of the Mississippi River approximately nine miles upriver from New Orleans, LA. Avondale, previously a wholly-owned subsidiary of Odgen Corporation, was sold in 1985 to its employees in an Employee Stock Ownership Plan (ESOP). Since it began operations in 1938, Avondale has developed into one of the largest and most diversified shipyards in the country. The yard has constructed dry cargo ships, large crude carriers, complex chemical parcel tankers, large high-speed containerships, Navy ships, Coast Guard cutters, offshore drilling rigs and drill ships; and it has the distinction of being the only American shipyard to have constructed LASH vessels. A total of 22 were built with the aid of construction-differential subsidy.

Avondale also maintains an active repair operation for commercial and naval ships. Inland waterway and offshore oil vessels are repaired by Avondale's Westwego and Harvey Divisions. Offshore platforms, jackets, and production modules are constructed for the oil industry by Avondale's Offshore Division in Morgan City, LA.

In 1982, the Navy awarded contracts to Avondale for the major conversion of three former Sea-Land SL-7 class containerships to T-AKR fast sealift ships for the DOD Rapid Deployment Force. Avondale has completed the reconstruction of these ships, the ANTARES (T-AKR 294), the ALTAIR (T-AKR 291), and the POLLUX (T-AKR 290). The latter was redelivered to the Navy in March 1986.

Avondale's new construction orderbook as of October 1, 1986, consisted of six fleet oilers (T-AO's) with options for up to two additional T-AO's, and three dock landing ships (LSD's). The company also expects to start work on the Vidalia Hydroelectric Plant in 1987.

Avondale's main yard facility totals 222 acres and contains three outfitting docks equipped with supporting shops and over 6,000 feet (1829 m) of pier space, an upper shipbuilding area that is capable of constructing ships up to 300,000 dwt. or three Panamax sized ships concurrently, and a lower shipbuilding area that is capable of building five LASH ships concurrently. Avondale's unique transfer method, modern construction techniques, and steel processing facilities have made it one of this country's most productive shipyards.

Avondale's upper yard shipbuilding area has two large positions to accommodate vessels of up to 1,020 feet (311 m) in length by 175 feet (53 m) beam. The major part of one ship can be erected along with the stern section of a second ship on position No. 1 while a third hull is being completed on position No. 2. Ships constructed in the upper yard move laterally in three positions for launching by Avondale's large floating drydock which can accommodate ships as large as 1,000 feet by 216 feet (305 m by 66 m), with a lifting capacity of 81,000 long tons (82296 metric tons).

Avondale's lower yard has a side-launching construction area that has three large positions to accommodate ships as large as 1,200 feet by 126 feet (366 m by 38 m) with a light weight of approximately 16,000 long tons (16026 metric tons). Ships built in the lower yard move laterally toward the river and parallel to the river in five positions. Up to five large vessels, greater than 700 feet (213 m) LOA, can be under construction simultaneously in this lower yard area. A Panamax floating drydock, which was placed in service in 1982, is moored in this area for the repair of ships and to support the docking requirements of new construction. This drydock can accommodate ships up to 750 feet by 110 feet (228 m by 34 m) and has a lifting capacity of 20,000 long tons (20320 metric tons).

Avondale's lifting capability includes: a 600-ton (545 metric ton) floating crane which was recently supplemented by a 250-ton (227 metric ton) turnover rig; a 225-ton (204 metric ton) and three 160-ton (145 metric ton) whirley cranes in the upper yard; and two 150-ton (136 metric ton) plus one 125-ton (113 metric ton) whirley cranes in the lower yard. In addition, Avondale has 29 cranes with 50-ton (45 metric ton) or greater capacity.

Avondale's steel fabricating facilities have the capability to fabricate up to 196,000 tons (177,928 metric tons) of steel per year. There are four primary shops: the Plate Shop, Beam Shop, Blacksmith Shop, and Sheetmetal Shop, which are enclosed within steel and concrete buildings totaling 273,150 square feet (25375 m2). Principal fabricating facilities include a panel line, beam welder, stress relieving and normalizing furnaces, and pickling vats in the structural area. The fabrication of structural units is supported by two paint and blast buildings.

Avondale's nearby Westwego, LA, facility is capable of building vessels 450 feet (137 m) long by 90 feet (27 m) beam. A floating drydock with a lifting capacity of 3,800 long tons (3861 metric tons) is available at Westwego for repair of small ships, river boats, and barges.

Avondale has invested heavily in facility improvements since 1970. Recent significant improvements include, among others, a new enlarged machinery and piping module assembly building, a non-ferrous pipe fabrication shop to supplement the semi-automated pipe shop that was added a few years ago with MARAD support, new plasma arc burning equipment, and a new fabricated beam shop.

Avondale has similarly continued its technology transfer and investment program and completed its direct technology transfer program with Ishikawajima-Harima Heavy Industries Co., Ltd. (IHI) of Japan. The program is fully implemented in the current construction of the T-AO 187 class ships.

In July 1986, the total labor force was 5,600, up from about 4,600 a year earlier. Employment is expected to increase in late 1986 as construction escalates on the LSD's.

Exhibit 3 is a current arrangement plan of Avondale's main plant.

3. Bath Iron Works Corporation

Bath Iron Works Corporation, a wholly-owned subsidiary of Bath Acquisition Corportation, which is itself a subsidiary of Bath Holding Corporation, is located on the Kennebec River in Bath, Maine. The small iron foundry which was established on this site in 1826 became Bath Iron Works, Ltd., in 1884, and the first shipbuilding began in 1889. This yard has a history of proven diversity, having constructed various type of ships including roll-on/roll-off cargo vessels, containerships, tankers, dredges, barges, fishing vessels, destroyers, and guided missile frigates. Bath has built a total of 168 destroyers for the Navy.

The last commercial ships built at the yard were two 34,000-dwt. product tankers, the FALCON LEADER, delivered in August 1983, and the FALCON CHAMPION, delivered in January 1984.

Bath Iron Works is one of the industry leaders in design, construction, and modernization of destroyer-type vessels for the U.S. Navy. BIW was the lead shipbuilder for the Navy's guided missile frigate (FFG-7 class) program. The lead ship, the OLIVER HAZARD PERRY, was completed in 1977; and the Navy has awarded the company follow-on contracts for the construction of 23 additional FFG-7 class frigates, the last of which is scheduled for delivery in early 1987.

The Navy in 1982, selected Bath Iron Works as its second source for the high-technology CG 47 class Aegis cruiser program, awarding the company contracts to build two of these Ticonderoga class cruisers (CG-51 and CG-58). In 1986 two additional CG 47 class cruisers were ordered, the last of which is scheduled for delivery in 1990. The lead shipyard in the program is the Ingalls Shipbuilding Division of Litton Industries which currently has seven of these ships on order or in production.

In 1985, BIW was selected as the lead shipbuilder for the design and construction of the Navy's Arleigh Burke class guided missile destroyer (DDG-51) program. Actual construction of the lead ship is scheduled to begin in 1987 with delivery in 1989.

In the early 1970's, BIW instituted modular construction and preoutfitting processes.

In 1974, Bath completed a major expansion and modernization program. The upgrading of facilities included the reconstruction of two shipways to accommodate ships of 700 feet (213 m) in length with a maximum beam of 130 feet (40 m), or two ships per way with a beam of 54 feet (16 m) each; the installation of a 220-ton (200 metric ton) level-luffing crane with sufficient outreach to erect units on both shipways; and new steel fabrication shops and equipment that have increased steel throughput capacity by 50 percent. To accommodate its accelerated naval shipbuilding program, BIW in 1979 began an additional facilities improvement program which continued into 1981. Included in the earlier stage of this program were expansion of the main assembly building to double the interior work area, installation of additional computer-aided lofting and burning equipment, and expanded machine shop and pipe shop capability.

More recent improvements were an additional blast and paint facility and two 300-foot by 60-foot (91 m by 18 m) platens with movable covers.

Complementing its shipbuilding activities, BIW has a fully staffed Overhaul Division and Industrial Products Division.

In addition to the two upgraded building positions, Bath operates one other shipway that can accommodate a ship 650 feet (198 m) in length with a beam of 88 feet (27 m). For drydock work at its main yard, there is an 8,400-ton (8534 metric ton) floating drydock that can handle ships up to 550 feet by 88 feet (168 m by 27 m). Two wharves and a pier provide a total of 2,150 linear feet (655 m) for outfitting and repair work.

BIW operates a supporting facility, the 33-acre Hardings fabrication plant, located three miles (4.8 km) from the shipyard at East Brunswick, where the initial steel fabrication takes place. At this plant, steel is blasted and coated, cut, straightened, or shaped. The steel is then transported to Bath by truck or rail where it is joined together into subassemblies for final erection at the shipway. The Hardings plant has been highly mechanized and computerized, and much of the work is automated.

In a joint industrial development with the State of Maine and the City of Portland, BIW built a new ship overhaul and repair yard in Portland Harbor. The new facility became operational in late 1983. Its centerpiece is a large floating drydock with a lifting capacity of 81,000 long tons (82296 metric tons), greatly expanding the company's capabilities in the overhaul and repair field.

As of mid-1986, the company's administrative and production work force totaled 6,680, compared to 6,795 a year earlier.

Exhibit 4 is a current plot plan of the Bath Iron Works main yard facilities, and Exhibit 5 is a general arrangement drawing of BIW's repair and overhaul yard in Portland, Maine.

4. Bay Shipbuilding Corporation

Bay Shipbuilding Corporation, in Sturgeon Bay, Wisconsin, is the largest shipbuilder on the Great Lakes. Its parent company, The Manitowoc Company, Inc., purchased Sturgeon Bay Shipbuilding and Dry Dock Company in 1968 and the adjoining Christy Corporation property in 1970. These two facilities were combined to form the Bay Shipbuilding Corporation. The present 80-acre site has channel access from both Lake Michigan and Green Bay and provides ample dock space for Great Lakes vessel repair and new construction.

Bay Shipbuilding, a full-service shipyard, has built more modern self-unloading drybulk ships than any other yard in the United States. From 1973 through 1981, 15 self-unloading Great Lakes ore carriers were delivered, including six 1000-foot-long (305 m) vessels.

With declining orders for construction of Great Lakes ore carriers, Bay Shipbuilding in 1980 entered salt water shipbuilding competition by delivering a 396-foot-long (121 m) tank barge and a 407-foot-long (124 m) tank barge. In 1981, two 550-foot-long (168 m) oceangoing deep-notch barges were completed; and in August 1982, a 610-foot-long (186 m) oceangoing deep-notch barge was delivered. With the delivery in September 1982 of a tug/barge to Amoco Oil Company for service on the Lakes, no new construction work remained in the yard. Overhaul of the Coast Guard cutter, MACKINAW, and tank top renewal of the ore carrier, WILLIAM CLAY FORD, provided work until April 1983. Bay Shipbuilding in March 1983 was awarded a contract for conversion of the former general cargo/containership, PRESIDENT HARRISON, to an auxiliary crane ship (T-ACS 1) for the Navy. This project was completed on May 1984. In August 1983, the company was awarded a contract from Lambert Point Barge Co., Inc. to build a 550-foot (168 m) long oceangoing coal topping-off barge. This 35,000-dwt. self-loading and self-unloading barge was delivered in late June 1984.

On October 22, 1984, Sea-Land Corporation signed a contract to have three 1,400-TEU containerships constructed at Bay Shipbuilding. The keel was laid for the first ship in August 1985 and the last of the three ships is scheduled for delivery in June 1987.

The company in 1977 completed a major facilities expansion program that has enabled the shipyard to build 1,000-foot (305 m) Great Lakes bulk carriers. The new graving dock can accommodate a vessel as large as 1,100 feet by 136 feet (335 m by 41 m) and is the largest such dock in the Lakes. It is serviced by a 200-ton (182 metric ton) traveling gantry crane and several crawler cranes. More recently the following facilities were added to the yard's modern plant: an additional 2,400 linear feet (732 m) of new dock wall; an extensive expansion of the fabrication shop with 200-ton (182 metric ton) bridge crane lifting capacity; new pipe shop, carpenter shop, and stores distribution center; shot blast and prime surface treatment line; one-side panel welder; computer lofting; and in-house design capabilities. Steel fabrication capacity for ship construction is estimated to be 36,000 tons (32681 metric tons) per year.

Bay operates a side-launching way that can accommodate a maximum ship size of 730 feet by 105 feet (223 m by 32 m), and one floating drydock having a lift capacity of 7,000 tons (7112 metric tons) is available which can handle ships up to 640 feet by 68 feet (195 m by 21 m). There are 7,095 feet (2163 m) of berthing space for repair and outfitting. The 14 available piers are serviced by crawler cranes of up to 80 tons (73 metric tons) capacity each.

At mid-1986, total employment was 1,500, up from 589 a year earlier. The increase is due to the Sea-Land containership construction project.

Exhibit 6 is a current general arrangement plan showing Bay Shipbuilding's facilities.

5. Bethlehem Steel Corporation - Beaumont Yard

This shipyard, located on the Neches River in Beaumont, Texas, was established in 1917 by Beaumont Shipbuilding and Drydock Company, which built C1-A cargo ships and Navy minesweepers during World War II. Bethlehem acquired the yard in 1947 and has pioneered in the design and production of mobile offshore drilling rigs and offshore oil and gas facilities. The Beaumont plant has been one of Bethlehem's most successful operations and has been a world leader in production of offshore drilling rigs and drillships. It is also an experienced builder of barges, primarily of the sophisticated tank type required by Gulf Coast industries for the transportation of liquid and bulk chemicals.

Beaumont is also experienced in fabrication of non-ship industrial products such as process and pressure vessels, oil and LPG storage tanks and spheres, rotary cement kilns, and blast furnace structures. Its bending-roll capacity and stress-relieving furnace are among the largest in the South.

Bethlehem-Beaumont has delivered more than 50 jackup drilling units since building its first jackup rig in 1954 and has also designed and built both semisubmersibles and drillships. The yard's last drilling rig was delivered in November 1982. Since then, shipyard work for the depressed offshore oil industry has declined.

In November 1982 and January 1983, the Navy awarded Bethlehem Steel Corporation contracts to reconstruct five Maersk Line RO/RO ships to maritime prepositioning ships, as part of the Navy's program to support the Rapid Deployment Force. Two of these five ships were converted at the company's Beaumont yard, with some of the work subcontracted to Todd-Galveston. Each vessel was lengthened 157 feet (48.8 m), and the depth was increased from 54 feet (16.4 m) to 70 feet (21.3 m). Work on the first ship, the ELEO MAERSK (renamed the PFC. WILLIAM B. BAUGH) began in January 1983; and the reconstructed vessel was redelivered in October 1984. Work on the second ship, the EMILIE MAERSK (renamed the 1st LT. ALEXANDER BONNYMAN, JR.) started in August 1983; and the reconstructed vessel was redelivered in September 1985.

The Beaumont Yard is highly mechanized. In the early 1970's the company installed a multimillion-dollar panel line and new material handling facilities. During the past several years, other capital improvements included: installation of a CNC plasma burning machine, larger plate bending rolls, larger overhead bridge cranes, pipe burning and bending equipment, an additional pipe fabricating shop, better and more automatic welding equipment, an updated electrical distribution system, mobile cranes, better building platens, automated air compressors, a CAD/CAM system, and an extensive computer network for use in engineering, planning, estimating, and material control.

Bethlehem-Beaumont has one side-launching way that can accommodate ships up to approximately 960 feet by 105 feet (293 m by 32 m) and also operates a smaller side-launching way which is available for barge or module construction.

There are 3,450 feet (1052 m) of fully-serviced piers and wharves and mobile equipment for servicing ships or other vessels at pierside or anchorage. With a 500-ton (508 metric ton) lift capacity, the company's barge-mounted "Big Bessie" is the largest floating derrick between Houston and New Orleans.

In mid-1985, Beaumont opened its Sabine Yard in Port Arthur, Texas, for offshore drill rig repair utilizing a 64,000 long ton (65,069 metric ton) lifting capacity floating drydock, one of the country's largest. This eight-section Navy surplus drydock is leased from the Port of Port Arthur and can accommodate vessels up to 950 feet (290 m) in length.

Employment at Bethlehem's Beaumont and Sabine facilities dropped to about 250 in mid-1986, but has since recovered and is expected to reach 700 in early 1987 due to an expanding level of ship repair and steel fabrication work. In mid-1985 the workforce totaled 900.

Exhibit 7 is a current layout of the Beaumont plant and facilities.

6. Bethlehem Steel Corporation - Sparrows Point Yard

The Sparrows Point shipyard is located on the Patapsco River in the Baltimore, MD, metropolitan area. Established in 1891, the yard became part of the Bethlehem organization in 1916 and served as a major shipbuilder during two world wars. During World War II, Sparrows Point constructed 101 vessels of 16 different classes. During the 1950's an 1960's, it was among the most active yards in the Nation, specializing in series construction of standard sizes of Bethlehem-design tankers, as well as freighters and containerships. Sparrows Point is primarily a shipbuilding yard, and in its building basin, the second largest in the United States, it is capable of constructing ships of sizes up to about 300,000 dwt. The yard is also capable of accomplishing repair and conversion work with the building basin serving as a drydock facility.

In November 1977, this shipyard completed the last of a series of five 1,100-foot (335 m) crude carriers (MA Design T10-S-101b), among the largest tankers ever built in the United States. In 1979 and 1980 two containerships (MA Design C8-S-85d) were completed and delivered to Farrell Lines. Since 1979, Sparrows Point has built six Bethlehem-design offshore drilling rigs and six 47,000-dwt. oceangoing tug/barge tankers (Construction of the tug portion was subcontracted to Halter Marine).

In 1985, the yard completed the major conversion of three Maersk Line RO/RO ships to maritime prepositioning ships, as part of the Navy's MPS program to support the Rapid Deployment Force. Each vessel was lengthened 157 feet (48.8 m), and the depth was increased from 54 feet (16.4 m) to 70 feet (21.3 m). The first of the ships, renamed the CPL. LOUIS J. HAUGE, JR., was redelivered in September 1984; the second ship, the PFC. JAMES ANDERSON, JR., was redelivered in March 1985; and the third vessel, the PVT. HARRY FISHER, was redelivered in September 1985.

In addition, during 1985, the yard completed the reflagging of five Barber Steamship Lines RO/RO vessels for the Ready Reserve Fleet, the repair of a collier, and the overhaul of a Navy vessel.

In 1986, the yard completed the construction of two feeder barges and repairs on five tug boats, one RO/RO prepositioning ship, one general cargo vessel, one crane ship, one tanker, and two vessels for the City of Baltimore.

As of October 1, 1986, the yard was in the process of designing and constructing two oceanographic survey ships (T-AGS) for the U.S. Navy, drydocking and repairing the LSD, HERMITAGE, and the AD, USS SHENANDOAH, as well as repairing one general cargo vessel for the Ready Reserve Fleet.

In October 1986, the yard was awarded a contract for the construction of tunnel sections for the Hampton Roads Tunnel Complex for the State of Virginia. This project is expected to be completed in 1988.

With its range of skills, tools, and facilities, this yard has been called upon regularly by various industries to produce large-scale steel fabrications, weldments, and a variety of specialized assemblies.

To provide the capability for construction of supertankers at Sparrows Point, millions of dollars were invested in facilities improvements; such as, establishing new production and material handling methods, installing new and sophisticated systems and equipment, and developing new design concepts and engineering techniques. The major components of this program, completed in 1974, were the building basin for construction of ships as large as 1,200 feet by 192 feet (366 m by 59 m) and a new panel shop for fabrication of steel. This fabrication shop is capable of constructing panels weighing up to 200 tons (182 metric tons). Other improvements included the structural strengthening of Pier No. 1, a numerically controlled gas plate cutting machine, automated plate and shape blasting-coating equipment, and expanded machine shop and pipe shop. During the third quarter of 1985, the yard completed the dredging of berth areas, approach channels and in-yard channels.

Since the yard's forecast for ship construction and servicing indicates that demand will center around smaller-sized vessels, a two-position intermediate gate was installed to increase the flexibility of its 1,200-foot (366 m) building basin by dividing it into two sections. In one position the basin's sections are 900 feet and 300 feet (274 m and 91 m) in length. In the second position, the sections are 685 feet and 515 feet (209 m and 157 m) in length.

Complementing the large construction basin, which is served by four 100-ton (91 metric ton) tower cranes, Sparrows Point maintains two building ways. One way can accommodate a maximum ship size of 800 feet by 106 feet (244 m by 32 m), and the other a maximum ship size of 800 feet by 95 feet (244 m by 29 m). Two smaller sliding ways are being used as platen areas and would require extensive refurbishing to reactivate. The yard does not have drydocking facilities except for the building basin. Four outfitting berths are available with a combined length of 3,970 linear feet (1210 m) of space serviced by four tower cranes with lifting capacities up to 50 tons (45 metric tons). Several locomotive cranes of various capacities are also available.

The total labor force at Sparrows Point was 1,290 at mid-1986, up from 1,185 a year earlier.

Exhibit 8 is a current plot plan outlining the company's construction facilities.

7. Fraser Shipyards, Incorporated

The Fraser Yard, the only major American shipyard and drydock operation on the Western end of the Great Lakes, is located on Howards Bay in Superior, WI. Since it was founded in the 1890's by Capt. Alexander McDougall, who built 42 of his famous "whaleback" steamers and barges there, this plant has had a succession of owners. From 1900 to 1926, Superior Shipbuilding Company operated the yard and built more than 50 large Great Lakes ore carriers. The yard became a repair facility of the American Ship Building Company from 1926 to 1945 and then became known as Knudsen Brothers Shipbuilding and Dry Dock Company.

Fraser-Nelson Shipbuilding and Dry Dock Company took over the plant in 1955, and the present name was adopted in 1964. In August 1977, the yard was sold to Reuben Johnson & Son, Incorporated, a Superior, WI, contracting and construction firm, but business continues under the Fraser name.

Since World War II, this complete shipbuilding and ship repair facility has specialized in vessel repair and ship modernization including lengthenings, repowering and engine room automation, and self-unloader conversions. In the past 15 years, Fraser has performed most of the major ship lengthening work on the Great Lakes. At this shipyard, general ship repair also has been an important source of revenue.

In 1981, Fraser completed the $14.2 million conversion of the CHARLES M. BEEGHLY from a straight-deck bulk carrier to a self-unloading bulker for Interlake Steamship Company. In May 1982, Fraser Shipyards completed conversion of three ships of

U.S. Steel Corporation's Great Lakes fleet -- the ARTHUR M. ANDERSON, CASON J. CALLAWAY, and PHILIP R. CLARKE -- to conveyor-type self-unloaders. Following completion of these vessels, there was no major repair or conversion work, until the conversion to diesel power of the GEORGE A. SLOAN which was completed in June 1985.

In October 1986, with no work underway in the yard, employment including salaried personnel totaled only 80 people.

In the early 1980's, the Fraser yard instituted a major renovation of its fabrication capabilities including a 40 percent increase in its platen table capacity and extension of its railroad trackage to increase steel unloading capabilities by 300 percent. An all-new steel cutting process with hydraulic loading and unloading tables was installed, as well as major repowering of the shipyard to support the expanding facilities and to improve existing capacity. New automated welding equipment and related modern techniques also were instituted to increase productivity.

Fraser maintains two graving docks suitable for ship construction, repair, and conversion work. One basin can accommodate a vessel 825 feet by 82 feet (251 m by 25 m), and the other a vessel 620 feet by 61 feet (189 m by 19 m). A small graving-type dock was added in 1973 to build new midbody sections for the bulk ore freighters under contract for lengthening at that time. There are 4,450 feet (1356 m) of pierside berthing.

Fraser's 10 mobile cranes, ranging from 15 tons (14 metric tons) to 150 tons (136 metric tons) can service any building dock, as well as outfitting and repair berths, and also can be floated on a crane lighter for work afloat. The company also operates an "outside" repair fleet totaling 12 units -- tugs, work launches, and barges -- capable of performing repairs on vessels while they are loading or unloading cargoes in Duluth-Superior harbor and adjacent ports.

Exhibit 9 is a current plot plan of Fraser's shipbuilding and ship repair facilities.

8. General Dynamics Corporation - Electric Boat Division

This shipyard, located in Groton, CT, is privately owned, but engaged exclusively in construction of submarines for the U.S. Navy.

9. Ingalls Shipbuilding Division/Litton Systems, Incorporated

The Ingalls Shipbuilding Division of Litton Systems, Inc., is located on the Gulf of Mexico in Pascagoula, MS. Ingalls is a diversified shipbuilding facility experienced in the construction, modernization, conversion, and overhaul of Navy warships and auxiliaries. In addition, the shipyard participates in ship system analysis and ship conceptual and detail design. Ingalls was a pioneer in the application of modular construction in the U.S. shipbuilding industry.

Shipbuilding for the U.S. Navy is now this shipyard's primary business. Specializing in highly sophisticated naval combat ships, Ingalls has become one of the Nation's foremost designers and builders of destroyers, cruisers, and amphibious assault ships.

Between 1975 and October 1986, Ingalls designed, built, and delivered to the Navy 45 surface combatant ships. These included 31 Spruance class (DD-963) destroyers, four Kidd class (DDG-993) guided missile destroyers, five Tarawa class (LHA-1) amphibious assault ships, and five CG-47's, a new class of Aegis guided missile cruisers.

During 1981 and 1982, 13 jackup drill rigs and four semisubmersible drill rigs were also delivered to six offshore drilling companies.

In April 1985, Ingalls completed the complex modernization and reactivation of the World War II battleship, IOWA, and in August 1986 was awarded a contract to reactivate the WISCONSIN, its sistership.

As of October 1, 1986, the company held orders for eight additional Aegis cruisers. The last of these ships is scheduled for completion in 1990. In May 1985, Ingalls laid the keel for the lead ship of a new class of multi-purpose amphibious assault ships, the LHD-1, an Ingalls' design. Delivery is scheduled for the end of 1989. In September 1986, Ingalls was awarded a contract to build a second LHD scheduled for delivery in 1992, and has options to build the third and fourth ships of the class. Ingalls also has a regular workload of Navy overhauls and repairs.

Ingalls' East Bank facility has been in operation since 1938, engaging primarily in construction of commercial cargo ships and tankers. In 1974, Ingalls completed a series of highly productive containerships, the last commercial ships built at the yard. The yard maintains six inclined shipways. Maximum ship sizes which can be accommodated are: Four ways 650 by 90 feet (198 m by 27 m), one way 690 feet by 85 feet (210 m by 26 m) and one way 550 by 80 feet (168 m by 24 m).

The East Bank facility has a graving dock which has been used for construction and overhaul of nuclear-powered submarines, but is currently being used for ship repair work. A wharf and four piers serviced by cranes with a 60-ton (54 metric ton) maximum capacity provide a total of 5,450 feet (1661 m) of berthing space for outfitting and topside repair.

The newer 600-acre West Bank facility, completed in 1970, was designed and equipped for series production using state-of-the-art modular construction methods. The yard is geared to assembly-line construction of large Navy and merchant ships.

The West Bank yard does not have conventional inclined shipbuilding ways. Instead, fabricated steel and subassemblies are brought from the fabrication, panel, and shell shops to the subassembly area where they are erected into major subassemblies and preoutfitted; these in turn move to the module assembly area. These areas are divided into five bays, each of which can produce 6,000-ton (5447 metric ton) modules. After modules are completed (including outfitting) in the module assembly area, they are moved to the integration area where they are erected into a complete ship. The completed ship is then moved to a floating drydock (resting on a submerged grid) which is subsequently floated and moved to a deep-water area where it is ballasted and the ship launched. The drydock can launch or recover a maximum ship size of 850 feet by 173 feet (259 m by 53 m). Approximately 4,400 feet (1341 m) of berthing space, serviced by cranes up to 200 tons (182 metric tons) are available for outfitting.

The company's technical pioneering in shipbuilding is continuing with the use of computer-aided design and manufacturing systems, such as integrated CAD/CAM, to streamline and automate the process of designing and building modern ships.

Ingalls Shipbuilding Division of Litton Industries at mid-1986 employed a total labor force of 12,700, up from 11,550 a year earlier.

Exhibits 10 and 11 are current general arrangement plans of facilities in the Ingalls East Bank and West Bank Yards.

10. Lockheed Shipbuilding Company

Lockheed Shipbuilding, a wholly owned subsidiary of Lockheed Corporation, is located in Seattle, WA, on the southern perimeter of Puget Sound's Elliott Bay. This 95-year-old shipyard was known as Puget Sound Bridge and Drydock Company when acquired in 1959 by Lockheed. In 1965, the company's name was changed to Lockheed Shipbuilding and Construction Company and was changed again in early 1984 to its present name. In 1986, Lockheed officially opened two new facilities, the Gulfport Marine Division in Gulfport, Mississippi, and the Savannah Division in Savannah, Georgia.

At Lockheed's Seattle plant a wide variety of vessels have been constructed, including light cruisers, destroyers, patrol frigates, ammunition ships, amphibious transports, oil drilling vessels, the world's largest hydrofoil, a large bulk carrier, a roll-on/roll-off ship, and several ferries. In 1976 and 1977, Lockheed delivered two U.S. Coast Guard icebreakers, the POLAR STAR and the POLAR SEA, the world's most powerful non-nuclear icebreakers.

With the scarcity of commercial ship orders, the Navy has again become Lockheed's best customer. In March 1979, the yard delivered its first naval vessel in six years, the submarine tender EMORY S. LAND (AS-39). A second tender, the FRANK CABLE (AS-40), was delivered in September 1979; and the third, the MCKEE (AS-41), was delivered in July 1981.

Lockheed is the lead yard in the construction of a new class of amphibious dock landing ships. In 1981, the Navy awarded the company the contract to support the design as well as to build the first of the class, the WHIDBEY ISLAND (LSD-41). It was delivered in January 1985. Lockheed also built the GERMANTOWN (LSD-42) which was delivered in February 1986 and is completing the FORT MCHENRY (LSD-43), which is scheduled for delivery in June 1987. Lockheed is also completing the repair and overhaul of three Washington State ferries.

In September 1985, the Navy awarded Lockheed a contract for the construction of two air-cushion landing crafts (LCACs) with deliveries scheduled for April and November 1988. Lockheed is constructing the LCACs at its new Gulfport, MS, facility although the design and engineering work on this contract will be accomplished in Seattle.

In June 1986, the U.S. Army awarded Lockheed a contract to build seven landing utility craft (LCU's). These are used to carry cargo to landing points ashore. They are being built at Lockheed's Savannah Division. The first vessel will be delivered in September 1987 and the remainder in 1988.

During the first nine months of 1986, the company's repair and overhaul work consisted almost entirely of Navy contracts. Commercial repair work was at its lowest volume in several years.

Lockheed Shipbuilding's Industrial Products and Services Division, also based in Seattle, is equipped to do heavy custom steel work, including structural and plate work, and a wide range of fabrication work.

Lockheed builds and outfits ships in two plants adjacent to Seattle's deepwater port. The plants offer a full range of facilities, engineering, and craft skills. To improve shipbuilding technology to meet requirements for construction of complex naval vessels, Lockheed has upgraded its production facilities and has accomplished system changes. To handle the increased production rate, Lockheed installed a modernized, numerically controlled steel cutting system and a semi-automatic steel fabrication panel line.

The Seattle yard operates three inclined shipways, two of which can accommodate a ship up to 650 feet by 90 feet (198 m by 27 m), and one which can handle a ship as large as 690 feet by 90 feet (210 m by 27 m). These building ways are serviced by 10 whirley cranes varying in capacity from 28 tons (25 metric tons) to 100 tons (91 metric tons). Lockheed maintains one floating drydock which can accommodate a maximum ship size of 643 feet by 96 feet (196 m by 29 m). Also available are 6,500 feet (1981 m) of wharf and pier space that is used for both repair and outfitting. Whirley cranes up to a capacity of 57 tons (52 metric tons) service the wharf and pier areas. Multiple crane lifts and locally available floating cranes routinely provide capacities up to 600 tons (545 metric tons).

Lockheed's labor force at mid-1986 totaled 1,450, down from 2,047 a year earlier.

Exhibits 12 and 13 are current general arrangement drawings of the Seattle yard's Plant No. 1 and Plant No. 2 -- those that can construct a vessel at least 475 feet (145 m) length overall with a beam of 68 feet (21 m).

11. Marathon LeTourneau Company - Gulf Marine Division

Marathon Manufacturing Company, a world leader in production of offshore drilling rigs, launched its Gulf Coast shipyard, the Gulf Marine Division, in 1971 with a commitment of several million dollars. This 133-acre shipyard is located in Brownsville, TX, and has a 2,500-foot (762 m) frontage on the Brownsville ship channel. Since it was founded, this Marathon yard has built and launched semi-submersible and jackup drilling rigs totaling more than 150,000 tons of production, and has the capability to build and launch drill ships, crane barges, work boats, tugs, and large commercial vessels. The Gulf Marine Division's total marine construction and repair capabilities are supported by Marathon's Engineering Group in Brownsville and by Marathon's manufacturing facilities in Longview, TX, and Vicksburg, MS.

The Gulf Marine Division provides major repair, modification, and conversion work on offshore drilling rigs and other oceangoing vessels at Brownsville and has sent repair and maintenance teams to locations around the world. The yard can also fabricate packaged mobile power plants and other types of equipment as well as perform heavy metal fabrication.

One jack-up rig was delivered at Marathon's Brownsville yard in 1984, and another was delivered during the second quarter of 1985 to Penrod Drilling Company. Since then, the yard has built four large production modules, two platform drilling rigs and has been engaged in rig maintenance and repair work.

The Brownsville yard operates one launchway with a maximum vessel size of 1,100 feet by 150 feet (335 m by 46 m) on which oceangoing ships could be constructed in the event of national emergency. Steel plate and other materials move from a 400,000 square-foot (37160 m2) in-yard storage area and from four warehouses through a 450-foot by 240-foot (137 m by 73 m) plate shop equipped with a 55-foot (17 m) wide automated panel line. Modular construction techniques are combined with conventional shipbuilding methods. Large module sections are fabricated on a forming and subassembly slab about 400 feet by 200 feet (122 m by 61 m), which is actually an extension of the yard's building way. A 250-ton (227 metric ton) gantry crane travels on rails which run the full length of the slab and the building way. The crane lifts the subassembly sections from the slab to the launchway, and the sections are joined to form the completed vessel which is then side-launched. The 250-foot by 120-foot (76 m by 37 m) covered pipe shop has a complete range of positioning, welding, and cutting equipment. Usable berthing space for outfitting and repair totals 2,100 feet (640 m).

At mid-1986, the total work force at the Brownsville plant was 500, up from 425 a year earlier.

Exhibit 14 is a plot plan of the yard's construction facilities.

12. Marine Power & Equipment Company, Inc.

This medium-size shipyard, in business in Seattle, WA, since 1946, is capable of construction, conversion, and repair of a wide variety of vessels, including towing, fishing, oil survey and support vessels, ferries, oil rigs, and Government ships. Marine Power & Equipment Company (MPE) is a subsidiary of WFI Industries, Inc., of Seattle.

MPE is a full service shipyard complete with drydocks, fabricating and welding shops, machine shops, electrical and electronic shops, and other shops and essential marine oriented services.

From 1979 through 1982, the company's principal ship construction consisted of six passenger/car ferries for the State of Washington.

From 1983 through 1985 several oceangoing barges and tugs and 28 LCM's (landing craft) for the Navy were built at MPE. The largest vessels built were two state-of-the-art triple deck RO/RO barges for Seaway Express. These barges, for service to Alaska, are 487 feet (148 m) in length.

In February 1986, MPE filed for protection under Chapter 11 of the U.S. bankruptcy law. As of October 1, 1986, the yard was engaged in the repair of both commercial and military vessels.

Although Marine Power's shipbuilding and repair complex comprises five yards, new construction work for vessels over 475 feet (145 m) in length is done in Yard 4 with support available from other divisions. The company operates seven building ways, and the maximum size vessel that can be built is 500 feet by 104 feet (152 m by 32 m).

In this yard, modular construction techniques are combined with conventional shipbuilding methods. Production facilities have been upgraded by the installation of a modernized numerically controlled steel cutting system and a semi-automatic steel fabrication panel line. CAD/CAM systems are used for lofting and design, and a Vision IV system is used for cost scheduling and control. Laser control alignment is used.

During construction of a deep-draft ship from 400 to 500 feet (122 to 152 m) in length, advanced zone-outfitting techniques would be used. Construction and launching would be in the company's Yard 4 where a 4,000-ton (4064 metric ton) capacity syncrolift is available for launching or retrieving vessels. Adjacent to the syncrolift is a building site which consists essentially of a flat concrete slab of sufficient dimensions to accommodate one ship. The syncrolift, since it is not sufficiently long for a large vessel in excess of 500 feet (152 m), would need to be extended in length for longer vessels. Movement of the ship from the construction site to the adjacent launching position would be accomplished by hydrolift. A film of water is introduced in between the lifting platform and the concrete slab to reduce friction, and trucks and/or winches would be used to push or pull the vessel sideways onto the syncrolift. This construction method and the hydrolift movement were used successfully in the construction of the six Washington State ferries and oceangoing barges up to 487 feet (148 m) in length.

In addition to the syncrolift, the company operates seven floating drydocks, the largest of which can handle vessels up to 400 feet by 57 feet (122 m by 17 m). Usable berthing space for outfitting and repair work totals 1,505 feet (459 m).

Total employment at Marine Power & Equipment Company in July 1986 was 220, compared to 250 a year earlier. Total employment at Yard 4 was 100.

Exhibits 15 is a current general arrangement plan of Yard 4 where the company's new construction work for vessels 475 feet (145 m) in length is accomplished.

13. National Steel and Shipbuilding Company

National Steel and Shipbuilding Company (NASSCO), the largest shipbuilder on the West Coast, participates in the commercial and U.S. Navy shipbuilding, repair, and conversion markets. In the marine business since 1945, the company has expanded several times to occupy 145-acres on the harbor in San Diego, CA. NASSCO is wholly owned by Morrison-Knudsen Company of Boise, ID.

In the past, NASSCO has constructed special purpose ships such as ferries, an oceanographic research ship, special purpose barges, passenger ships, tugs, minesweepers, dry cargo ships, and a variety of Navy vessels.

From 1973 to October 1, 1984, NASSCO completed two San Clemente class (80,500 dwt.) oil/bulk/ore carriers, six Coronado class (38,300 dwt.) tankers, 13 San Clemente class (90,000 dwt.) tankers, four San Diego class (188,500 dwt.) tankers, three Carlsbad class (37,500 dwt.) tankers, three La Jolla class product carriers (44,000 dwt.), and two Ingram class (37,500 dwt.) product carriers. The San Diego class tankers were the largest vessels ever built on the West Coast. In July 1983, the company delivered the SHENANDOAH (AD-44), the last of a series of four Gompers class destroyer tenders built at NASSCO; and in March 1984, a large cable repair ship, the ZEUS (T-ARC-7), was delivered to the Navy.

In 1982, NASSCO was awarded contracts to convert three Waterman RO/RO containerships into maritime prepositioning ships to support the DOD Rapid Deployment Force. The first of these ships, renamed the SGT. MATEJ KOCAK, was redelivered in October 1984. The second and third Waterman ships, renamed the PFC. EUGENE A. OBREGON and the MAJ. STEPHEN W. PLESS, were redelivered in January and May 1985, respectively.

Also in 1982, the Navy awarded NASSCO contracts to reconstruct three former Sea-Land SL-7 class containerships into T-AKR fast sealift ships. The first of the ships, the USNS ALGOL (T-AKR 287), was completed and turned over to the Navy in June 1984. The second vessel, the USNS BELLARIX (T-AKR 288), was redelivered to the Navy in September 1984. The last of the three T-AKR's, the USNS REGULUS (T-AKR 292), was redelivered in August 1985.

In 1983, the Navy awarded contracts to NASSCO to convert two 90,000-dwt. San Clemente class tankers into 1,000-bed hospital ships (T-AH). The first vessel, U.S.N.S. MERCY, was redelivered in December 1986. The second vessel, U.S.N.S. COMFORT, is scheduled to be redelivered in May 1987.

In August 1984, Exxon Shipping Co. signed a contract with NASSCO for construction of two new 209,000-dwt. crude oil carriers with December 1986 and February 1987 delivery dates.

Repair and overhaul work in 1986 consisted principally of Navy contracts.

In the fourth quarter of 1983, NASSCO placed in operation a new 25,000-ton (25400 metric ton) floating drydock which has enabled the yard to respond more fully to both Navy and commercial ship repair markets. Additionally, in 1985 an automated steel plate and shape, blast and prime line was added. In 1986 an automated pipe silo was installed and the pipe shop was improved and expanded.

NASSCO's facilities include a building dock in which ships up to 980 feet by 170 feet (299 m by 52 m) can be constructed. In addition, the company operates three inclined building ways. Two of these can accommodate a maximum size ship of 900 feet by 106 feet (274 m by 32 m) and one a ship size of 690 feet by 90 feet (210 m by 27 m). Cranes are available that can provide lifts up to 175 tons (159 metric tons). Berthing is available at 10 full-service berths that can accommodate ships with drafts up to 35 feet (10.6 m) and lengths up to 1,000 feet (305 m).

The company's fabrication and assembly facilities cover 143,000 square feet (13284 m2) of fabrication and subassembly area and have approximately a 2,000-ton (1816 metric ton) per week capacity.

As of mid-1986, the total labor force was 3,920, down from 4,630 in mid-1985.

Exhibit 16 is a current NASSCO plot plan.

14. Newport News Shipbuilding

Newport News Shipbuilding, located at the Port of Hampton Roads in Newport News, VA, is the largest shipbuilding complex in the United States. The company, founded in 1886, is a subsidiary of Tenneco, Inc. Newport News has built 23 aircraft carriers, 37 nuclear-powered submarines, and 121 other surface ships for the U.S. Navy. Commercial vessels delivered by the yard include 71 cargo ships, 85 tankers, 61 passenger ships (most notably the famed superliner UNITED STATES), and more than 50 other vessels. Newport News was a pioneer in the field of jumboizing ships, and since 1957 has completed 34 such operations. A leader in the application of high technology to shipbuilding, the company provides a variety of engineering and design services to the Navy.

Newport News is the Nation's foremost builder of Navy nuclear warships. The yard as of October 1, 1986, was at work on three Nimitz class aircraft carriers and seven attack submarines. Overhaul and repair of nuclear-powered submarines and surface ships for the Navy is also a principal activity at Newport News. The last commercial vessel built in the yard was the CHEMICAL PIONEER, delivered in September 1983.

In July 1983, Newport News announced plans to build a new $300 million submarine construction and repair complex. The facility will be used mainly for nuclear attack submarines and will be completed in 1988. The project will involve four new building ways, a major new construction facility under cover, new outboard ways, a 600-foot (183 m) floating drydock, and the addition of two new piers. The Ring Module Shop was completed in November 1985. In this 510-foot (155 m) by 106 foot (32.3 m) Ring Module Shop, individual submarine hull rings are welded together to form module-length units and structural tanks, including piping, are installed, welded, and tested.

The 150-acre North yard was designed for high production and efficiency and has the capability to handle large components from fabricating areas to final erection. Data storage and retrieval systems control material storage and work flow. The building basin, the largest in the Nation, is 1613 feet (492 m) long, 250 feet (76 m) wide, and 33 feet (10 m) deep. The addition during 1982 of two 30 metric ton cranes and a third position for the intermediate gate further expands the multi-ship construction capability of this dock, permitting simultaneous ship construction and repair. A 900 metric-ton 23-story Goliath gantry crane, one of the largest in the world, can handle completely outfitted assemblies. This crane services the graving dock and the final assembly platen and has a height of 234 feet (71 m) overall, a girder clearance of 200 feet (61 m) and a span between rail centers of 540 feet (165 m). The North yard has one 1,670-foot (509 m) outfitting berth and one 950-foot (290 m) outfitting berth each of which are serviced by two 30 metric-ton cranes.

The older South yard has two inclined shipbuilding ways; the larger of these can accommodate vessels as large as 668 feet by 93 feet (204 m by 28 m). In the South yard, there are six graving docks in operation, two of which are used for construction work and are serviced by a 310 long ton (315 metric ton) gantry crane. The larger of these two basins can handle ships up to 1,100 feet by 136 feet (335 m by 41 m). The other four of the six graving docks in the South yard are used mainly for ship repair and overhaul work. Seven piers for outfitting and topside repair are available with a combined berthing space of approximately 12,000 linear feet (3658 m). These piers are serviced by cranes with capacities of up to 50 tons (45 metric tons) and are supplemented by locomotive cranes and floating derricks with capacities to 67 tons (61 metric tons).

Newport News Shipbuilding also has the following facilities which are utilized in ship construction and repair, manufacturing, and industrial work:

- A steel fabrication shop where various types of steel and other metals ranging in thickness from 1/8 inch (3 mm) to six inches (152 mm) up to 45 feet (14 m) long and weighing as much as 17-1/2 tons (16 metric tons), are cut and shaped to design specifications;
- A fully-equipped wood pattern shop facility;
- One of the largest foundries in the Nation where steel castings weighing as much as 138,000 lbs. (62597 kg) and alloy steels, copper, nickel, aluminum, brass, and other nonferrous alloys are poured;
- A machining complex with over 250 machines including a 42-foot (13 m) boring mill, and lathes with maximum swing of 124 inches (3150 mm) diameter and lengths up to 68 feet (21 m) between centers.
- A large pipe fabrication facility with machines capable of bending pipe up to 12 inches (305 mm) in diameter, horizontal boring mills, automatic welding machines, cleaning equipment and nondestructive and hydrostatic testing capabilities;
- A large sheet metal facility capable of manufacturing sheet metal components required for outfitting ships and other similar applications.
- Electrical switchboard and panel shops capable of manufacturing large and small electrical switchboards and panels; and,

- A computer center, testing laboratories, and over 1,000,000 square feet (92900 m2) of inside storage including a 106,000 square foot (9847 m2) automated material storage facility.

The labor force at Newport News in July 1986 totaled about 28,500.

Exhibits 17 and 18 are current general arrangement drawings showing major facilities in both the South yard and the North yard.

15. Norfolk Shipbuilding & Drydock Corporation

Norfolk Shipbuilding & Drydock Corporation (NORSHIPCO) has three shipyards in the City of Norfolk. The largest of the three, the Berkley Plant covers 100 acres and is located on the Southern branch of the Elizabeth River. The other two shipyards, Brambleton and Southern Plants, are on the Eastern branch of the Elizabeth River.

Norshipco's yards are among the best equipped on the East Coast. Available ship repair functions include tank cleaning and coating, machinery, electrical, carpentry, steel, piping, nondestructive testing, blasting, and painting. The company also offers a full range of repair service for ships located away from its yards.

This company has sophisticated new construction experience, as demonstrated in the construction of two U.S. Coast and Geodetic Survey (now National Ocean and Atmospheric Administration) vessels in the late 1960's and a Navy patrol frigate in 1975. Modern modular construction techniques are used in all construction and conversion work, including oceangoing vessels, barges, dredges, and fabricated midbodies.

In May 1985, NORSHIPCO delivered a 100-car ferry to the Delaware Transportation Department. During the past four years, the company's repair and overhaul business, continued at a steady pace. The start of the fourth quarter of 1986 saw the backlog of repair and conversion work at the highest level in the company's 70-year history.

In August 1986, NORSHIPCO was awarded a contract for the conversion of three merchant ships to auxiliary crane ships (T-ACS) for the Navy. The first vessel to be converted by NORSHIPCO, now EXPORT LEADER (T-ACS 4), is scheduled for redelivery in October 1987. The second, now LIGHTNING (T-ACS 5), is scheduled for redelivery in December 1987; and the third, now STAG HOUND (T-ACS 6), is set for delivery in February 1988.

A multi-faceted expansion program emphasizing repair operations was completed in 1979 at the Berkley Plant. The centerpiece of the project was a steel floating drydock, among the largest and most modern in the world. The drydock is 950 feet (290 m) long, 192 feet (59 m) wide, and 160 feet (49 m) between the wingwalls. Lifting capacity is 54,250 long tons (55118 metric tons). A new concrete pier, 1,030 feet (314 m) in length, is used for repair and servicing of ships as long as 1,200 feet (366 m). This new pier is used for mooring the large floating drydock. A giant Kroll L-1800 hammerhead jib trolley crane is located on this pier and spans the width of the floating drydock. The crane is also able to service ships alongside the pier.

During the past three years, NORSHIPCO's ongoing capital investment program continued, with expansion and modernization of its plants. One significant addition was the purchase and installation in 1985 of a one-piece, steel floating drydock to replace the 40-year old, six-section 12,000 ton (12,200 metric ton) capacity wooden drydock in the Berkley Plant. The new drydock can accommodate a vessel up to 750 feet by 90 feet (229 m by 27 m) with a lifting capacity of 20,000 long tons (22334 metric tons). In 1986, NORSHIPCO completed the installation of a large diesel engine parts repair facility known as Diesel Marine NORSHIPCO.

For major ship construction, the company's Berkley Plant operates a building way which can accommodate ships as large as 475 feet (145 m) in length by 85 feet (26 m) beam. The vessels are constructed on the flat building position and end-launched in one piece hydraulically into a floating drydock.

The largest of the company's marine railways, located in the smaller Brambleton Plant, can accommodate a vessel 441 feet by 60 feet (134 m by 18 m) with a lifting capacity of 5,500 long tons (5580 metric tons).

At the company's yards, a total of 12,170 feet (3709 m) of berthing space is available at several piers for outfitting and repair.

NORSHIPCO's workforce totaled 3,200 in June 1986, up from 2,770 a year earlier. The workforce is expected to increase to 3,500 by end 1986.

Exhibit 19 is a current plan of the Berkley Plant, the largest of the company's three plants.

16. Pennsylvania Shipbuilding Company

Pennsylvania Shipbuilding Company came into existence in February 1982 when its parent company, Paden, Inc., acquired this Chester, PA, yard from the ailing Sun Ship, Inc. In April 1984, a private investment group, based in Mobile, AL, acquired a majority interest in the parent company, and thus in the shipyard. The parent company's name has changed to Capital Marine Corporation.

Pennsylvania Shipbuilding Company is one of the largest and best equipped shipyards in the country. It covers 185 acres on a mile of the Delaware River waterfront, just south of Philadelphia, PA.

In its 64 years of operation, the shipyard designed and constructed more than 650 vessels, mainly commercial ships. In later years the yard specialized in the design and construction of RO/RO ships and medium-size tankers. In addition to its shipbuilding, conversion, and repair capabilities, the company also manufactured heavy industrial products.

In February 1982, when Penn Ship came into existence and acquired the facility, the shipyard was phasing out of ship construction and concentrating on ship repair and conversion. One RO/RO ship, the THOMAS HEYWARD, was under construction for Waterman Steamship Corporation and was completed by Penn Ship in February 1983.

In June 1984, Pennsylvania Shipbuilding completed the major conversion for the Navy of a former Sea-Land SL-7 containership to a fast sealift ship (T-AKR) for the DOD Rapid Deployment Force. This vessel, renamed the USNS CAPELLA (T-AKR 293) is 946 feet (288 m) in length overall. Pennsylvania Shipbuilding started work in October 1983 on the conversion of a sistership, the USNS DENEBOLA (T-AKR 289). This fast sealift ship was redelivered to the Navy in October 1985.

In May 1985, Pennsylvania Shipbuilding was awarded a contract by the Navy for the construction of two T-AO fleet oilers. The first vessel is scheduled for delivery in March 1989 and the second in December 1989. This was the first new construction contract awarded to the yard since June 1979.

In June 1985, Pennsylvania Shipbuilding retained the services of IHI, a major Japanese shipbuilder, to assist in production planning and implementation of modular construction and preoutfitting techniques.

In February 1986, the shipyard was awarded a construction contract for a third T-AO which is scheduled for delivery in September 1990. In addition to the T-AO program, other Navy work at the yard during 1986 included repairs to the guided missile frigate, USS PERRY, and the selected restricted availability of the USS PATTERSON, another guided missile frigate. Commercial work at Penn Ship during 1986 was minimal but active.

In 1976, completion of a major capital improvement program enhanced the shipyard's ability to fabricate larger, more sophisticated ships. This program provided a new level shipbuilding platform, a two-section floating drydock capable of lifting 75,000 long tons (76200 metric tons), a 1,100-foot (335 m) outfitting pier, and other shipbuilding support facilities. The new level shipbuilding slab has two sections. In this shipyard, a ship as large as 1,100 feet (335 m) in length and 195 feet (59 m) wide can be constructed. This is the maximum limit of the large floating drydock into which vessels built on the two-section shipbuilding platform are launched. Two halves of a large ship can be built on this platform and each half can be rolled individually to the drydock and then welded together. The ship is brought to the pier for outfitting and completion. The large drydock, which is capable of handling vessels up to about 300,000 dwt., is one the world's largest floating drydocks. It is serviced by two 23-ton (21 metric ton) gantry cranes, two 10-ton (9 metric ton) gantry cranes, two 25-ton (23 metric ton) truck cranes, a 150-ton (136 metric ton) barge crane, and an 800-ton (726 metric ton) barge crane with a 230-foot (70 m) boom.

In September 1982, in order to handle an increasing volume of repair and overhaul work, Pennsylvania Shipbuilding purchased and moved a medium-size floating drydock from Levingston Shipbuilding Company, its affiliate in Orange, TX, to the Chester, PA, plant.

A new modernization and expansion program, completed in 1980, improved the yard's fabrication shop facilities, which are now capable of approximately a 60,000-ton (54468 metric ton) annual steel throughput.

In addition to the two-section shipbuilding platform, two conventional sliding ways are available. Each can handle a ship as large as 745 feet by 129 feet (227 m by 39 m). The yard has a total of about 6,200 feet (1890 m) of usable berthing space with modern facilities at six deepwater piers.

In 1986, several facility improvements, slated toward further adaptation of product oriented ship construction, were undertaken or completed. Among these were: construction of an entirely new ferrous pipe shop; construction of a "pallet" marshalling yard; extension to the steel fabrication shop for indoor pre-outfit of assemblies; and, rearrangement of machinery and work areas to suit process lane building techniques. Future plans include additional blast and paint facilities and a new warehouse.

The extreme north end of the facility, which is not needed for shipbuilding activities, was converted in 1986 to a shipping terminal under a separate company, Penn Terminals, Inc. Loading and unloading of cargo for various ship owners commenced with offloading of steel slabs and loading of palletized drums of oil. Business at Penn Terminals has increased steadily since its inception in September 1986.

Employment at Pennsylvania Shipbuilding totaled 1,200 at mid-1986, compared with 1,190 a year earlier.

Exhibit 20 is the latest available layout of the plant and facilities at Pennsylvania Shipbuilding Company.

17. Portland Ship Repair Yard

The Portland Ship Repair Yard is part of the Municipal Corporation of the Port of Portland. The 125-acre shipbuilding and ship repair facility is located in Portland, OR, on the Willamette River. It and the major marine terminal facilities of the Port are reached via the Columbia River--a 106-mile passage from the Pacific Ocean and a 40-foot (12 m) deep and 600-foot (183 m) wide navigation channel.

The Portland Ship Repair Yard was developed from the World War II Swan Island Shipbuilding facilities which employed 132,000 persons and delivered 1,076 ocean-going ships. The shipyard currently employs 3,135 persons down from a peak of 4,200 persons, primarily engaged in major ship repair. In 1975, the shipyard constructed two 80-foot by 400-foot (24 m by 122 m) self-unloading covered barges.

The Portland Ship Repair Yard has no current orders for shipbuilding. However, this market is being aggressively pursued. Recently, the shipyard added an 81,000 ton (82353 metric ton) floating drydock, the largest drydock on the West Coast, and 3,000 feet (914 m) of modern deepwater repair and outfitting wharves with five whirley cranes 75 to 120 tons (68 to 109 metric tons) capacity. The maximum combined crane lift capacity is 220 tons (200 metric tons).

The shipbuilding facilities at the Portland Ship Repair Yard are capable of producing modular type units from 1,500 to 5,000 tons (1525 to 5084 metric tons), which are transported by rubber-tired vehicles, crawler or walker, via launching bridge to two locations. At one ship construction location, a vessel 475 feet by 100 feet (145 m by 30 m) can be constructed using the No. 3 drydock for launching. At the other location, a vessel up to 810 feet by 108 feet (247 m by 33 m) can be constructed using the No. 3 and No. 4 drydocks for launching.

Portland Ship Repair Yard operates four drydocks. The largest two (No. 3 and No. 4) can accommodate vessels up to 810 feet by 108 feet (247 m by 33 m), and 1150 feet by 181 feet (351 m by 55 m) respectively. A total of 6,900 feet (1798 m) of fully serviced pier space with 14 whirley type cranes are employed for outfitting. Recently, a new layberth facility (Berth 315) was added. It can accommodate two 1,100-foot (335 m) VLCCs in lay-up status.

The Portland Ship Repair Yard has 500,000 square feet (46450 m2) of fully-enclosed service shops and warehouse space. The 11 module assembly bays are 323 feet (98 m) long, 70 feet (21m) wide (clear), 60 feet (18 m) high (clear).

The Portland Ship Repair Yard is preparing to expand its modular construction capability by an additional 75 acres, located about six river miles downstream at its Rivergate Industrial Park. This facility will be suitable for constructing ship modules to 5,000 tons (5084 metric tons) which can be crawler transported, barge loaded, and joined and launched on No. 4 Drydock.

The shipbuilding assets of the Portland Ship Repair Yard are augmented by the individual facility user's assets. Northwest Marine Iron Works, Dillingham Ship Repair, Lockport Marine Company (a subsidiary of Lockheed Corporation), and West State, Inc., are contracted users of the facility. However, one user, Northwest Marine Iron Works, filed for protection under Chapter 11 of the U.S. bankruptcy law in late October 1986.

Significant projects accomplished in 1986 by Portland Ship Repair Yard contractors are: Dillingham Ship Repair; the conversions of the GRAND CANYON STATE (T-ACS 3), converion of the CAPE ISABEL to an RRF ship, and complete reconstruction of the machinery spaces on the PRINCE WILLIAM SOUND following a flooding casualty; Lockport Marine Company, major overhaul of the USCGC GLACIER (WAGB-4) and USS FORT FISHER (PLD-40) as well as construction of three complete new superstructures for Washington State Ferries; Northwest Marine Iron Works, re-engine of the USCGC STORIS, and conversion of the CAPE EDMONT to an RRF ship.

Other work consisted of regular scheduled overhauls of Alaskan crude tankers to 265,000 dwt. and Alaskan cruise vessels. Fourteen Alaskan North Slope oil production modules totaling 3,000 tons (3,050 metric tons) will be constructed in the coming year. Also in 1986 the 300-foot (91 m), 350-ton (356 metric ton) boom on a 2,000-ton (2,033 metric ton) heavy lift ship was replaced in one piece using the 1,200-ton (1089 metric ton) Lampson International mobile crane stationed at the Portland Ship Repair Yard.

Exhibit 21 is a current general arrangement plan of the Portland Ship Repair Yard facility and ship repair assets.

18. Robert E. Derecktor of Rhode Island, Inc.

Robert E. Derecktor of Rhode Island, Inc., founded in 1979, is located in Middletown, Rhode Island. This Derecktor Shipyard comprises over 44 acres of land situated on Coddington Cove in Narragansett Bay. The facility is approximately 6.5 nautical miles from Brenton Reef Tower (2.5 nautical miles northeast of the Newport Bridge) giving access to any size vessel. In 1975, Derecktor began to develop the 44 acres of waterfront property after the Navy abruptly deactivated most of its Rhode Island (Newport Naval Base) facilities in 1974. In 1979, negotiations with the Navy and the Rhode Island Department of Economic Development were concluded and the yard was officially opened. The first vessels built at the Rhode Island yard were 80-foot (24 m) fishing vessels. Over the years major conversion and repair work performed at the facility include: work on Navy and Coast Guard vessels, LNG tankers, floating drydocks, ferry boats, fire boats, barges, tugs, fishing trawlers, and miscellaneous private craft.

In January 1981, the Rhode Island yard was awarded a significant contract to design and construct nine 270-foot (90 m) medium endurance cutters (WMECs) for the United States Coast Guard. Work commenced on the project in June 1981. Two of the WMECs, SPENCER and SENECA, were delivered in December 1985 and July 1986, respectively. As of October 1, 1986, the yard had seven WMECs under construction, with the last vessel scheduled for delivery in 1989.

In 1985, Derecktor was awarded a contract by the City of New York's Department of Transportation for the construction of two 1,295-passenger ferries for service runs between Manhattan and Staten Island. Both ferries were delivered in 1986.

The Rhode Island facility is one of the most modern and complete in the northeast. This Derecktor yard utilizes a 153,000-square-foot (14213 m2) fabrication and assembly building, several inside shops, warehouses, engineering, design and office buildings, a 300-ton (272 metric ton) crawler crane, a 1,500-foot (457 m) deep water pier, and 6,500 feet (1982 m) of accessible and usable waterfront. In addition, the shipyard operates two floating drydocks which are joinable and thus capable of accommodating a vessel up to 725 feet by 90 feet (221 m by 27 m). For building vessels up to 500 feet (152 m) in length, modules are constructed in the fabrication building, with full erection and launching accomplished at the floating drydocks.

Fully equipped machine, piping, hydraulic, electrical, painting, carpentry and engine overhaul shops, and tank cleaning/storage capabilities enable all work to be done in-house. Over the past five years, extensive machinery and equipment have been put into place.

As of mid-1986, Derecktor's Rhode Island yard workforce totaled 698, compared to 986 in mid-1985.

Exhibit 22 is a current general arrangement of Derecktor's shipbuilding and repair facilities in Rhode Island.

19. Tacoma Boatbuilding Company

In operation since 1926 in Tacoma, WA, this shipyard designs, constructs, and repairs vessels for commercial customers, the Navy and Coast Guard, and foreign governments. Tacoma Boat's overall facilities consist of three yards over 30 acres of company-owned or leased property located adjacent to the Commencement Bay industrial complex.

World War II transformed Tacoma Boat from a builder of fishing vessels into one of many Government shipbuilders on the West Coast. In addition to the conversion of military vessels during this period, the company constructed 23 small naval vessels and support craft.

Tacoma Boat has grown continucusly through the years, producing a diversified construction pattern including a variety of standard-class tuna purseiners, a semisubmersible offshore oil-drilling rig, barges and tug/supply vessels for the offshore oil industry, WYTM icebreaking tugs for the Coast Guard, revolutionary-design tractor tugs, and high-speed patrol ships, gunboats, and minesweepers for the Navy and/or foreign governments. The company also helped design and build an 80-knot surface effect ship (SES).

Since the early 1970's Tacoma has designed and constructed four 245-foot (75 m) patrol gunboats under a Navy contract administered for the Saudi Arabian Government, four 270-foot (82 m) WMEC cutters for the Coast Guard, and six tractor tugs for Foss Dillingham.

During the 1984-1986 period, Tacoma delivered the first nine of 10 ocean surveillance ships (T-AGOS) to the Navy, the STALWART, the CONTENDER, the VINDICATOR, the TRIUMPH, the ASSURANCE, the PERSISTENT, the INDOMITABLE, the PREVAIL, and the ASSERTIVE. This T-AGOS contract has become a focal point for zone outfitting in which various portions or "zones" of a ship are built separately as virtually complete units and then assembled at the launchway.

In September 1985 Tacoma filed for protection under Chapter 11 of the U.S. bankruptcy law. As of October 1986, Tacoma had yet to deliver one T-AGOS ship for the Navy, two 6,200-dwt. incinerator ships for At-Sea Incineration, and one corvette missile for the Government of Thailand.

The company also designs and manufactures deck machinery under the name of Northern Line.

To broaden the company's shipbuilding base, Tacoma Boat expanded its operations in 1981 with the installation of CAD/CAM (Computer-Aided Design and Computer-Aided Manufacturing) which is used in conjunction with zone outfitting construction techniques. The Navy T-AGOS program is the first Tacoma Boat contract to use zone outfitting exclusively.

Tacoma Boat's facilities include four end-launch construction ways and a new side-launch way fitted with a marine railway and serviced by a 200-ton (184 metric ton) whirley crane. This new building way, which became operational in 1982, permits launching of ships, barges, or drill rigs up to 650 feet (198 m) in length. Its width is about 400 feet (122 m). The facility launches into water 20 feet (6 m) deep.

The company currently operates one floating drydock which can handle vessels up to 420 feet by 64 feet (128 m X 20 m) and has a lifting capacity of 4,000 tons (4,067 metric tons). However, in early 1987, this drydock is expected to be returned to the Navy.

Available for outfitting and repair work is 4,200 feet (1280 m) of berthing space. In addition, a 200-foot by 60-foot (91 m by 18 m) maximum ship capacity marine railway was placed in operation in October 1986.

The total work force at Tacoma Boat at mid-1986 was 550, down from 1,440 a year earlier.

Exhibits 23 and 24 are current general arrangement drawings of the company's three yards.

20. Tampa Shipyards, Incorporated

Founded in 1948, Tampa Shipyards, Inc., (formerly Tampa Ship Repair and Drydock Co.) is a full-service yard and is the largest shipbuilding and repair facility in Florida. It was purchased by The American Ship Building Company in 1972 and is located on the recently deepened 43-foot (13 m) Sparkman Channel in Tampa, FL.

During World War II, the company built Navy auxiliary vessels and C2 cargo ships for the Maritime Commission. Since World War II, Tampa Ship has been a major Gulf Coast repair yard, serving many of the tanker fleets operating on the Gulf and repairing cargo ships, barges, and a wide range of oceangoing vessels.

In July 1981, Tampa Ship's parent company, The American Ship Building Company, was awarded a $73 million contract to convert four Moore McCormack C4 cargo ships (with the aid of CDS) to larger self-sustaining breakbulk/container vessels. The first ship was redelivered by Tampa Ship in August 1982, and the second was completed at the company's Lorain Yard in October 1982, with the third and fourth completed at Tampa in December 1982 and June 1983, respectively.

In 1986, Tampa Shipyards, Incorporated, a subsidiary of the American Ship Building Company, under contracts signed in 1983, with Ocean Carriers, Inc., completed construction of the last two of five new 30,000-dwt. clean-product, ice-strengthened tankers for charter to the Military Sealift Command. The preponderance of work was accomplished at Tampa Shipyards, although Avondale Shipyards built the forebodies and ADDSCO Industries completed the deckhouse steel work. Final assembly and outfitting took place at Tampa Ship. The first three T-5 tankers, the PAUL BUCK, the GUS W. DARNELL, and the SAMUEL COBB, were delivered in June, September, and November 1985, respectively. The RICHARD G. MATTHIESEN was delivered in February 1986 and the LAWRENCE H. GIANELLA was delivered in May 1986.

In order to compete in today's highly technical shipbuilding industry, Tampa Shipyards embarked on an innovative, expansion program. During 1984, major new facility installations were completed and integrated into the current ship construction program.

Recent additions include: a new concrete pier, two graving docks, two wet berths, additional shops, and an erection/assembly building. The erection/assembly building is 600 feet by 145 feet by 115 feet (183 m by 44 m by 35 m), and is serviced by three overhead bridge cranes with a lifting capacity of 1,000 tons (908 metric tons). About 350 feet (107 m) of this building straddles one of the new graving docks, allowing preassembled units weighing in excess of 500 tons (508 metric tons) to be erected in a totally enclosed environment.

The company currently has four graving docks operational. The largest can handle ships up to 896 feet by 146 feet (273 m by 45 m). Two of these four graving docks went into service in the third quarter of 1984. Each of the two new drydocks can accommodate a vessel as large as 746 feet by 121 feet (227 m by 37 m).

To provide additional fabricating capability, Tampa Ship has acquired a long-term lease on the Westinghouse heavy steel fabricating facility on Tampa's Westshore. This facility provides 11 acres of covered fabrication floor, bridge cranes from 200 to 700 ton (182 to 635 metric ton) capacity, and barge loading facilities. The building is two hours by tow from Tampa Ship.

Tampa Ship currently leases two wet berths north of the main yard at South Slip. These wet berths are 840 feet (256 m) and 700 feet (213 m) long and are leased from Tampa Port Authority and Tampa Electric Company.

The yard is also upgrading other areas including modernization of the steel fabricating, sheet metal, carpentry, machinery, electrical, and pipe departments, as well as blasting and painting facilities.

As of October 1, 1986, Tampa Shipyards Incorporated was completing preliminary engineering and contract drawings on two major shipbuilding projects. Construction is scheduled to begin in the first quarter of 1987. One project involves the construction of two 800-passenger cruise ships. These 15,200 ton, 16 knot vessels will be twin screw, diesel electric, and will service the Hawaiian Island cruise market. The other project involves the construction of two seafood processing vessels. Each vessel will be 400 feet (122 m) in length by 106 feet (32 m) in width and totally self-contained.

As of mid-1986, 300 people were on the Tampa payroll compared to 1,760 in mid-1985. The substantial decrease in employment is due to the delivery of the last T-5 tanker.

Exhibit 25 is a general plan of Tampa Ship's main yard. Neither the South Slip nor the Westinghouse facility is shown.

21. Todd Shipyards Corporation - Galveston Division

The Galveston Division of Todd Shipyards Corporation was founded in 1934 on Pelican Island on the Galveston Ship Channel. The yard, located directly across from the City of Galveston, TX, is a ship construction, repair, and conversion complex with a work force experienced in custom industrial steel fabrications. The shipyard was awarded the Navy's "E" Award for its substantial contribution during World War II in the field of ship repair.

In the past decade, this Todd facility has become an important part of the Gulf Coast oil drilling industry, turning out an impressive inventory of modern oil-related ships, barges and specialized craft. The most outstanding of these vessels was the APACHE, a large self-propelled, pipelaying reel ship for Santa Fe International Corporation. Completed in 1979, this was the first ship of its kind ever constructed.

Ship repair and overhaul have for many years been a major segment of work at Galveston; but conversion work has also been a mainstay of the company. Over the past 15 years, 25 major conversions were successfully accomplished. During 1981 and 1982, Todd's Galveston Division delivered four large oceangoing barges. In 1983 and 1984, under a contract with Bethlehem Steel, the yard installed a new midbody in the ELEO MAERSK and the EMILIE MAERSK, two Maersk Line cargo ships which were converted to maritime prepositioning ships by Bethlehem-Beaumont.

The Navy in May 1984 awarded Todd-Galveston a design contract authorizing design work on the conversion of two RO/RO containerships, MA Design C5-S-78a, to Aviation Logistics Support Ships (T-AVB), with options for their reconstruction. In December 1984, the Navy exercised the option for the first ship, the YOUNG AMERICA, which was renamed the WRIGHT and redelivered in May 1986. The option for the second vessel, the GREAT REPUBLIC, was exercised in December 1985 with redelivery scheduled for July 1987. This vessel will be renamed the CURTIS.

At Todd-Galveston, vessels up to 475 feet by 85 feet (145 m by 26 m) can be constructed under roof on a launching pontoon and then launched into one of the yard's floating drydocks.

In its continuing effort to increase its repair business, Todd in April 1982, also put into operation at its Galveston plant one of the largest floating drydocks on the Gulf Coast. The new 40,000 metric ton drydock, built by Kawasaki Heavy Industries, Ltd., in Japan, is capable of lifting ships as large as 225,000 dwt. and all drill rigs with beam no greater than 160 feet (48.7 m).

As a result of Todd's decision in 1984 to consolidate its Houston yard with its Galveston facility, Houston's new 17,500 ton (17780 metric ton) floating drydock was moved to the company's Galveston shipyard. This drydock, which became operational in May 1984, can accommodate vessels up to 600 feet by 118 feet (183 m by 36 m).

There are four piers at the main Galveston yard. The usable berthing for outfitting and repair work totals about 6,400 linear feet (1950 m). These piers are serviced by seven rail-mounted, revolving gantry cranes ranging from five tons (4.5 metric tons) to 75 tons (68 metric tons) that also service the platen areas. In addition to the outfitting and repair berthing piers, a new layberth with support facilities, other than gantry, was placed into operation in late 1982. This layberth can accommodate ships up to 1,000 feet (305 m) in length and 140 feet (43 m) beam.

Completing Todd's Galveston complex is the Southwest Plant support facility, located within approximately one mile (1.6 km) of the main yard with more than 90,000 square feet (8361 m2) of covered manufacturing area. This facility is serviced by two 200 ton (182 metric ton) overhead cranes which combine to make 400 ton (362 metric ton) lifts possible. The Southwest Plant is used principally for steel fabrication and hull erection and has a 200 foot by 86 foot (61 m by 26 m) slip, of which 160 feet (49 m) are covered.

As of mid-1986, total employment was up to an average of 800, compared to about 620 a year earlier. However, this figure has declined since the first Navy T-AVB conversion was completed, and unless new work is obtained, will continue to decline since the only work currently underway at the yard is the other T-AVB conversion.

Exhibit 26 is a current plan of the main yard and the Southwest Plant.

22. Todd Pacific Shipyards Corporation - Los Angeles Division

Todd's Los Angeles Division is located on a city-leased 116-acre site in the West Basin of the Port of Los Angeles. This facility, formerly Los Angeles Shipbuilding and Drydock Company, was managed for the Navy by Todd beginning in 1942. Todd purchased the shipyard facilities in 1946. In 1977, Todd's Los Angeles and Seattle Divisions were organized as the Todd Pacific Shipyards Corporation, a wholly-owned subsidiary of Todd Shipyards Corporation.

The facility is a full-service, design, construction, conversion, and repair shipyard, having continually expanded over the years to fill the needs and meet the future challenges of the maritime industries and the national defense base.

During World War II, Todd-LA built 10 major Navy auxiliary ships including destroyer tenders (AD) and repair ships (AR). Since that time, this shipyard has engaged in construction, conversion, and repair of both commercial and Navy ships. On the commercial side, the company built five cargo ships, eight product tankers, and several barges and specialty craft. Commercial reconstruction included eight conversions from cargo ships to container vessels, a LPG forebody, and numerous midbody projects.

In the 1950's and 1960's, in addition to the conversion of several major Navy auxiliary ships, the yard constructed nine destroyer-type vessels. Since the late 1970's, the Navy has awarded Todd-LA contracts to build a total of 18 sophisticated guided missile frigates (FFG-7 class). As of October 1, 1986, two of these ships remained on order or in production. The last frigate is scheduled for delivery in November 1988.

During the past three years, Todd-LA has performed repair and overhaul work on several types of naval combatant and auxiliary vessels, as well as post shakedown availability work on guided missile frigates and AEGIS class guided-missile cruisers. Reconstruction of the RO/RO vessel, SS MATSONIA, is currently in progress with redelivery scheduled for March 1987.

Over the past 15 years, the yard has pursued an ongoing facilities expansion and modernization program in parallel with shipbuilding, conversion, and repair work. The inclined building ways and supporting cranes were modified from three ways, limited to 1950-60 era maritime construction and destroyer class newbuildings, to two ways capable of "Panamax" and cruiser class construction. Complementing the building ways capabilities expansion, the upland construction areas have been developed into a fully-equipped sophisticated production line, including integrated process flow lanes and work stations for fabrication and full pre-outfitting of modules prior to erection on the building ways.

Shops have been extended in size, platens expanded, craneways extended, and numerically-controlled manufacturing machinery added. One of the first robotic production welding centers in U.S. shipbuilding is also in full operation. Line heating technology was fully implemented in early 1986.

A full computer-aided engineering center is operational, providing numerical control for lofting and automated machinery for production, as well as design and production services. Production planning, purchasing, and material control systems are also computer assisted.

The most recent facility expansion project in this program is the addition of a land-level ship lift (Syncrolift) transfer facility. The presently completed phase of the facility includes a shiplift platform 655 feet by 106 feet (200 m by 32 m) with a lifting capacity for vessels up to 48,000 dwt., a side-transfer system, and two work bays which became operational in March 1984. According to Todd's management, these additions have doubled the Los Angeles Division's ship construction capacity and increased its repair capability by 250 percent. Further expansion (three additional work bays) is to continue in an orderly phased program over the next four years until the total project is completed.

Other facility projects recently completed or in progress include: relocation of the floating drydock with new mooring dolphins (concrete) and modernized utility support; certification of Building Way No. 1 to MIL-STD-1625B; redesign and replacement of the yard's power distribution systems; relocation of a gantry crane to the plate yard; extension of the No. 9 craneway; and installation of a seam welder in the Plate Shop.

Todd-LA operates one floating drydock, which can handle a vessel up to 711 feet by 86 feet (217 m by 26 m). Berthing space in the yard totals 6,175 feet (1,882 m).

Two complete shoreside Navy crew living complexes are available to accommodate crew members while their ships are undergoing PSA, SRA, overhaul, or other repair work at the shipyard.

Research and Development (R&D) in shipbuilding technology continues to be an important interest of the shipyard's management. Presently, the yard sponsors two SNAME/SPC technical panels: Outfit Planning (SP-2) and Flexible Automation (SP-10). Research under other SNAME/SPC panels is being conducted in other areas of robotics, waterborne coatings, shipbuilding standards, and outfitting aids. The Los Angeles Division has been established as the Todd corporate center for R&D and advanced shipbuilding technology development for which a Naval Technology Division was established in March 1984. An independent research and development program for other projects having special interest or impact on the corporation is also conducted at the shipyard.

Total employment at the yard was 2,640 in mid-1986, down from 2,900 a year earlier.

Exhibit 27 is a plant map of the Los Angeles Division's facilities.

23. Todd Shipyards Corporation - San Francisco Division

Under the terms of a three-party agreement consummated on October 14, 1982, Bethlehem Steel Corporation sold this 40-acre San Francisco shipyard to the city and sold the yard's equipment, including drydocks, to Todd Shipyards Corporation. The San Francisco Port Commission took title to the land, piers, and buildings; and Todd acquired a 30-year lease on this property.

The San Francisco Division of Todd Shipyards Corporation was established in Alameda in 1948. It offers a complete range of ship repair and reconditioning services and can handle conversion and jumboizing work, as well as industrial work. It is also capable of constructing large oceangoing ships.

In the 1950's, ship repairs, conversions, and special industrial work were followed by construction of two destroyer escorts, five C4 Mariner class cargo ships, a wine tanker, and four medium-size commercial oil tankers.

This San Francisco Division demonstrated its flexibility in the 1960's. Numerous tankers were jumboized from 1961-1964. In addition, with the onset of offshore drilling, Todd constructed from tanker midsections an offshore drill rig.

During 1983 and 1984, in addition to Navy work, the yard completed extensive modifications to passenger accommodations on a large cruise ship, construction of a graving dock for Mare Island Naval Shipyard, and construction of submarine propulsion shafts for General Dynamics-Electric Boat.

During 1985 and the first three quarters of 1986, the yard was engaged primarily in ship repair, overhaul, and maintenance work for the Navy. Other work included drydocking and repair of various commercial vessels.

Todd's San Francisco shipyard operates one building way, a conventional end-launch type that can accommodate ships up to 550 feet by 90 feet (168 m by 27 m). The yard's larger floating drydock with a maximum vessel size of 950 feet by 144 feet (290 m by 44 m) has a lifting capacity of 65,000 long tons (66,040 metric tons). This drydock, designed by Bethlehem and built at the San Francisco yard, is capable of serving the largest tankers that transport crude oil from Alaska to West Coast ports. Also available is a second floating drydock with a maximum vessel size of 700 feet by 95 feet (213 m by 29 m), and about 3,385 linear feet (1,032 m) of usable berthing space along four piers, all fully serviced with utilities and by cranes of up to 50-ton (45 metric tons) capacity.

At mid-1986, the yard's work force totaled 450, approximately the same as a year earlier.

Exhibit 28 is a current plot plan of Todd's San Francisco plant and facilities.

24. Todd Pacific Shipyards Corporation - Seattle Division

Todd's Seattle Division is located at the northwest corner of Harbor Island in Elliot Bay, less than 10 minutes from downtown Seattle, WA. From 1898 until 1916, when the William H. Todd Company of New York bought the shipyard from the Seattle Construction and Drydock Company, a variety of vessels were produced, including the world's finest six-masted barkentine and (at that time) the world's fastest single-screw steamer.

This 52-acre yard has been a prime supplier of fighting ships for the Navy. During World War II, Todd operated three shipyards in the Seattle-Tacoma area, mainly turning out destroyers and aircraft carriers. More than 57,000 persons worked three shifts during the war years, constructing over 125 ships as well as repairing and servicing some 2,700 deep-draft vessels of all sizes, types, and flags.

In 1952, Todd-Seattle added two shipbuilding ways which further enhanced their capabilities. Since 1952, the yard has built 80 vessels of 20 distinctly different types -- from two self-unloading phosphate barges, to a surface effect craft, to 13 guided missile frigates (FFGs), to a floating drydock especially designed to drydock nuclear-powered attack submarines, as well as 12 barges.

As of October 1, 1986, work in the yard included the modernization of eight Hamilton class Coast Guard cutters with the last scheduled for redelivery in March 1990, and the overhaul of the frigate USS O'CALLAHAN (FF 1051) which is scheduled for redelivery in October 1987.

This yard has an active ship repair and overhaul operation that annually works on from 200 to 300 commercial and naval vessels. The Seattle Division has been appointed authorized repair and service representative for B&W/M.A.N. Diesel of Denmark and Sulzer Marine Diesels of Switzerland. In 1985, the yard received Navy certification for Master Ordinance Repair (M.O.R.) and the Department of Defense's Quality Excellence Award.

The FFG Program provided the impetus for a multi-million dollar capital investment program for improving productivity of the Seattle yard in ship repair, overhaul, and conversion. In July 1982, the company transferred a 40,000 metric ton floating drydock from its San Francisco Division to Seattle. A new 150-ton (137 metric ton) traveling whirley crane on the adjacent 1,000-foot (305 m) concrete pier serves the floating drydock and the adjacent berths. A second pier was rebuilt in concrete and lengthened to give the yard a 1,000-foot (305 m) berth with a 40-foot (12.2 m) water depth. Other facility improvements include a new machine shop, a facility for pump and motor testing, special balancing equipment for rotors up to 15,000 pounds, a new valve shop, and a calibration facility. The CAD/CAM capability was recently expanded to link all production, engineering, and material ordering/handling departments. Todd-Seattle is also developing its own oily water (bilge water) processing facility, which will allow direct service for all customer vessel bilge water and sewage requirements. When completed it will be the first and only such facility in a West Coast commercial shipyard.

The largest building way at Todd-Seattle can handle a ship up to 600 feet by 96 feet (183 m by 29 m). It can also be used as a dual launchway for simultaneous construction of two ships with beams of 50 feet (15 m) or less. A small side-launch building way was added in 1974. In addition to the 40,000 metric ton drydock, there are two other floating drydocks, the larger of which can accommodate ships up to 650 feet by 84 feet (198 m by 26 m).

Two wharves and five piers provide a total of 6,017 feet (1834 m) of berthing space for outfitting and repair. The yard is serviced by 15 whirley traveling cranes, with lifting capacities ranging from 25 tons (23 metric tons) to 150 tons (136 metric tons).

In June 1986, total employment at the Seattle plant was 850 down from 975 a year earlier.

Exhibit 29 is a current plot plan of Todd-Seattle's facilities.

25. The Toledo Shipyard

In January 1985, the Toledo-Lucas County Port Authority purchased this shipyard from The American Ship Building Company which owned the yard since 1947 and closed it in 1982. In September 1985, the yard was re-opened when Merce Industries, Inc., a 25-year old topside repair firm, entered into an agreement with the Port Authority to operate the shipyard for 25 years. The Toledo Shipyard is a complete, full-service shipyard, equipped for new construction, conversion, repair, and propeller repair.

Since Merce Industries, Inc., began operating the yard, they have made extensive repairs, and they have upgraded, and renovated the facility, including the leveling of the old fit-out building adjacent to one of the drydocks, which improved access to the pier area between the graving docks and the wet slip area. Merce Industries elected not to lease the buildings immediately adjacent to the yard as the firm had existing facilities that were superior and in the nearby area. These existing facilities include a 50,000 sq. ft. (4645 m2) fabricating/propeller repair facility and a 12,000 sq. ft. (1115 m2) machining and pressure vessel shop.

Complete facilities for propeller repair services in all alloys is available through the American Propeller Division.

The company maintains two graving docks. One can accommodate vessels up to 680 feet by 78 feet (207 m by 24 m), and the other, vessels as large as 540 feet by 68 feet (165 m by 21 m). Usable berthing space totals about 1,600 feet (488 m).

In July 1986, Merce Industries completed construction of a 360-foot wide by 60-foot deep (110 m by 18 m) notch barge for St. Marys Holdings, Inc. The barge is an ocean-going, ice-strengthened vessel with a totally self-contained pneumatic unloading system. In addition, the yard completed the construction of a passenger ferry which will be used locally in the Detroit area. Other work at the yard during the first three quarters of 1986 included repair of commercial vessels.

As of June 1986, employment at Merce Industries totaled 200, up from 150 in October 1985.

Exhibit 30 is a current lay-out of The Toledo Shipyard operated by Merce Industries, Inc.

Employment

Total employment trends over the past seven years in privately owned U.S. shipbuilding and ship repair yards (Bureau of Labor Statistics-SIC 3731-figures) are illustrated in the following table:

1980 Average	178,000
1981 Average	186,700
1982 Average	171,600
1983 Average	147,300
1984 Average	155,900
1985 Average	145,100
1986 January	144,800
1986 February	144,600
1986 March	138,000
1986 April	136,800
1986 May	136,600
1986 June	134,900
1986 July	133,500
1986 August	134,200
1986 September (Prelim.)	135,500

The Bureau of Labor Statistics (BLS) conducts a random sampling of employment in SIC 3731 (shipbuilding and ship repair) industry establishments. From this sample, employment data extrapolations are made and published monthly. It should be noted that the 1986 projections are preliminary and may be subject to extensive revision by BLS.

The Maritime Administration monitors employment in the 22 major U.S. privately-owned shipyards in the Active Shipbuilding Base (as identified in Exhibit 33 of this report) on a monthly basis. As of September 1986, employment in these 22 yards totaled 98,123 or approximately 72 percent of the preliminary overall shipbuilding and repair industry employment published for that date by the Bureau of Labor Statistics.

Ship Repair Facilities

While over 200 privately owned firms of varying capabilities are involved in repairing ships in the United States, only 55 yards are capable of drydocking vessels 400 feet in length and over. For ships this size, the U.S. shipbuilding and repair industry is currently operating a total of 58 floating drydocks, 34 graving docks, and several marine railways. However, some of these graving docks are committed to new construction. The large organizations which have drydocks generally have extensive waterfront acreage and are capable of all types of ship repair and maintenance. Major shipyards usually combine repair, overhaul, and conversion with shipbuilding capabilities, and employment usually numbers in the thousands. It is difficult to draw a sharp line between shipbuilding yards and ship repair yards, as many of the two engage in both types of work.

Since the downtrend in orders for new merchant vessels, several shipyards have in recent years expanded or upgraded ship repair, overhaul, and conversion facilities to improve their efficiency and competitive posture. Examples of recent, current, and planned plant expansion and modernization programs are:

- Newport News Shipbuilding

  In July 1983, Newport News announced plans to build a new submarine construction and repair complex which will be completed in 1988. This project will involve four new building ways, a major new construction facility under cover, new outboard ways, a 600-foot (183 m) floating drydock, and the addition of two new piers. In November 1985, a new 510-foot by 106-foot (155 m by 32.3 m) Ring Module Shop was completed in which individual submarine hull rings are welded together and structural tanks including piping are installed and tested.

- Norfolk Shipbuilding and Dry Dock Corporation

  NORSHIPCO placed in operation in August 1985 a floating drydock which was purchased from Verolme Botlek of the Netherlands. Built in 1960, the drydock can accommodate vessels up to 750 feet by 90 feet (229 m by 27 m), has a lifting capacity of 20,000 long tons (20334 metric tons). In 1986, NORSHIPCO completed the installation of a large diesel engine parts repair facility known as Diesel Marine NORSHIPCO.

- Todd Shipyards Corporation

  The recent facility expansion project at Todd's Los Angeles Division consists of a land-level shiplift (Syncrolift) ship repair and construction facility. The presently completed phase of the facility includes a shiplift platform 655 feet by 106 feet (200 m by 32 m) having a lifting capacity for vessels up to 48,000 dwt., a side transfer system, and two work bays. Further expansion (three additional work bays) is to continue in an orderly phased program over the next four years until the total project is completed.

  At Todd's San Francisco Division facility projects completed or in progress during 1986 included: relocation of the floating drydock with new mooring dolphins (concrete) and modernized utility support; redesign and replacement of the yard power distribution systems; relocation of a gantry crane to the plate yard; extension of a craneway; and installation of a seam welder in the Plate Shop.

Todd's Seattle Division is developing its own oily water (bilge water) processing facility, which will allow direct service for all customer vessel bilge water and sewage requirements. When completed it will be the first and only such facility in a West Coast shipyard.

- Tampa Shipyards, Inc.

As part of the yard's current facilities expansion program, two additional graving docks went into service in the third quarter of 1984, along with a new concrete pier, two wet berths, and additional shops and cranes. Each of these two new graving docks can accommodate vessels up to 746 feet (227 m) in length, and the wet berths can handle ships up to 900 feet (274 m) in length.

- Continental Maritime of San Francisco, Inc.

In early 1985, this San Francisco topside repair yard, formerly SFW Corporation, placed in operation a new 26,000-ton (26416 metric ton) lifting capacity floating drydock to greatly increase the company's repair, overhaul, and conversion capability. The drydock was built in West Germany.

- Bethlehem Steel Corporation

Bethlehem Steel Corporation in the summer of 1985, placed in operation one of the country's largest drydocks at its new Sabine Yard in Port Arthur, TX. The eight-section Navy surplus facility is leased from the Port of Port Arthur and will be used primarily for repair and inspection of offshore drilling rigs, although it can accommodate vessels up to 950 feet (290 m) in length. For rigs, the dock's sections can be arranged to provide a clear docking area of 362 feet by 414 feet (110 m by 126 m).

A construction project at its Sparrows Point yard was completed in 1986 which involved the installation of a two-position intermediate gate to increase the flexibility of its 1,200 foot (366 m) building basin by dividing it into two sections. In one position, the basin's sections are 300 feet and 900 feet (91 m and 274 m) in length. In the second position, the sections are 685 feet and 515 feet (209 m by 157 m) in length.

- New York Shipyard Corporation

This company purchased and re-opened in 1985 the former Todd Shipyard Corporation's, Erie Basin shipyard in Brooklyn, NY. The company has added three floating drydocks to the facility in addition to reconditioning the existing buildings. One drydock can accommodate a vessel up to 775 feet (236 m) in length, another up to 710 feet (216 m), and the third up to 475 feet (145 m).

o Lockheed Shipbuilding Company

Over the past 18 months, Lockheed opened two new facilities -- one in Gulfport, Mississippi, and one in Savannah, Georgia. Two air-cushioned landing crafts (LCACs) will be built for the Navy at the Gulfport facility and seven landing utility crafts (LCUs) will be built for the Army at the Savannah facility. Also, a Lockheed subsidiary, Lockport Marine Company, commenced operations in 1985 as a ship repair firm in Portland, Oregon. It is a contract user of the facilities at the Port of Portland.

o Pennsylvania Shipbuilding Company

In 1986 facility improvements completed included: construction of a new ferrous pipe shop; construction of a "pallet" marshalling yard; extension of the steel fabrication yard for indoor pre-outfit of assemblies; and rearrangement of machinery and work areas to suit process lane building techniques. Future plans include additional blast and painting facilities and a new warehouse.

o Portland Ship Repair Yard (PSRY)

The PSRY is preparing to expand its modular construction capability by an additional 75 acres, located about six river miles downstream at its Rivergate Industrial Park. This facility will be suitable for constructing ship modules to 5,000 ton (5,084 metric tons) which can be crawler transported, barge loaded, and joined and launched on its No. 4 drydock. In July 1986, a launch system consisting of a 3,000 foot (915 m) roadway, a launching bridge and a dock structure was placed in operation for use in the module construction industry. Also a new layberth facility was added in 1986 which can accommodate two 1,100 foot (335 m) VLCCs in lay-up status.

Ship repair is considered within the industry as generally more profitable than ship construction, and it is also seen as a means to maintain a skilled labor force. The repair yard often commands excellent prices for urgently needed repairs and can control its overhead closely. Ship repair yards over the last few years also have been actively soliciting non-ship industrial work requiring skills such as steel fabrication, welding, boiler repairs, and engine overhauls, typical in ship repair.

Repair of naval ships has become a matter of vital importance requiring the highest skill and dedication; and as the complexity and sophistication of warships grows, so must the capabilities of U.S. repair yards. This country's privately owned ship repair industry is an essential national resource in the planning and execution of the maintenance and upkeep of these complex naval ships. Private U.S. shipyards are continuing to receive at least 30 percent of the funds available each year for repairs, overhaul, and conversion of Navy vessels. Projected ship alteration and repair programs essential to maintain these ships at a high level of material readiness are expected to result in a nominal future workload increase for both naval and private shipyards. However, the large size and complexity of Navy combatant ships naturally restricts participation in this type of Navy work to a limited number of private yards despite the current emphasis on public/private shipyard competition in the repair sector.

The commercial ship repair market continued to be generally weak during 1986, and future prospects are uncertain. Navy repair and overhaul work continued to be a consistent and stable element in the repair industry's endeavors. Competition for all repair contracts has been intense.

Although several firms in the industry are readying their yards for greater future participation in the Navy repair and overhaul market, private ship repair capacity in many areas of the Nation continues to be underutilized.

Repair (with Drydocking) Facilities

Major drydocking facilities are defined in this report as those yards having at least one drydocking facility that can accommodate vessels 400 feet (122 m) in length and over, provided that water depth in the channel to the shipyard itself is at least 12 feet. These facilities may also be capable of constructing a vessel smaller than 475 feet by 68 feet (145 m by 21 m), and/or have drydocks for vessels smaller than 400 feet (122 m) in length.

Appendix B tabulates information updated through 1986 on 29 of these repair yards by coast. Additional information is available in the Office of Shipbuilding Costs and Production.

Major Topside Repair Facilities

Major topside repair facilities are those that have sufficient berth/pier space for topside repair of ships 400 feet (122 m) in length and over, provided that water depth in the channel to the facility itself is at least 12 feet. These facilities may also have drydocks for vessels smaller than 400 feet (122 m) in length and/or be capable of constructing a vessel smaller than 475 feet by 68 feet (145 m by 21 m). Services rendered by these firms vary from a simple repair job to a major topside overhaul, particularly when the work on oceangoing ships can be accomplished without taking the ships out of the water. It is common practice for a shipyard to send its personnel and equipment to provide voyage repairs while the ship is at anchor or working cargo at a commercial marine terminal. There is an increasing trend worldwide to send ship repairers to the ship rather than to bring the ship to the shipyard, thus calling for greater mobility of ship repair personnel. This trend creates a particular demand for highly skilled technicians versus the hull trades.

Appendix B also tabulates information through 1986 on the 38 topside repair yards' facilities (berth/pier space). The yards' building ways, drydocks, marine railways, etc., are not addressed herein as they cannot accommodate vessels 400 feet (122 m) in length and over. However, detailed data for these facilities has been obtained during the MARAD annual shipyard survey and is available in the Office of Shipbuilding Costs and Production.

Active Shipbuilding Base

The Active Shipbuilding Base, as identified by the Navy and MARAD, is comprised of 22 privately owned U.S. shipyards which are open and currently engaged in or seeking contracts for the construction of major oceangoing or Great Lakes ships 1,000 gross tons or over. Exhibit 33 of this report identifies and geographically locates these 22 yards.

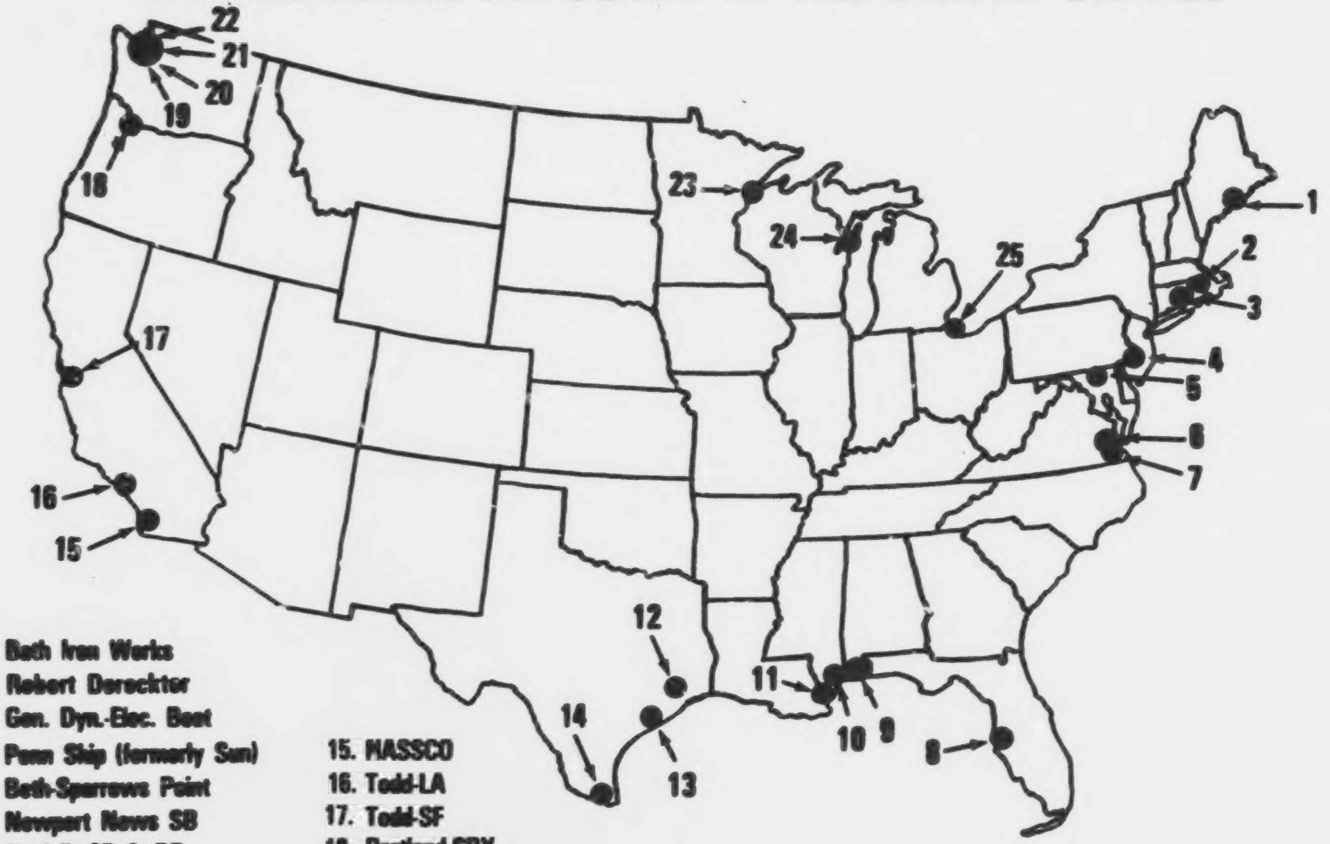
During 1986, the number of yards in the Active Shipbuilding Base was decreased from 24 to 22 as a result of the closure of General Dynamics' facility in Quincy, Massachusetts and Halter Marine's facility in Chickasaw, Alabama. At end-September 1986, these 22 yards employed roughly 72 percent of the U.S. shipbuilding and repair industry's total work force, as reported by the Bureau of Labor Statistics under SIC 3731. At that same time, 89 percent of the production workers in these 22 shipyards were engaged in Navy or Coast Guard ship construction and repair work.

As of October 1986, nine of the 22 shipyards were engaged in construction and/or conversion of major combat ships for the Navy. Three of the yards were building a total of seven major commercial vessels, and six of the yards were engaged primarily in ship construction and conversion work provided by the Navy's T-Ship program. Four of the yards had only repair and overhaul work and non-ship construction work.

Employment projections for production workers is shown by Exhibit 34 of this report. This data is generated by overlaying Navy projected five-year shipbuilding and conversion programs onto the estimated work force required to complete the current firm orderbook.

Exhibit 34, dated October 1, 1986, indicates a continuing gradual decline through mid-1989 in production workforce levels of the shipyards in the Active Shipbuilding Base, followed by a period of relatively stable workforce requirements into the early 1990's. These projections are contingent upon near-term economic conditions and future Administration and Congressional action with regard to continuation of the proposed Navy shipbuilding and conversion programs.

SHIPBUILDING INDUSTRY IN THE UNITED STATES

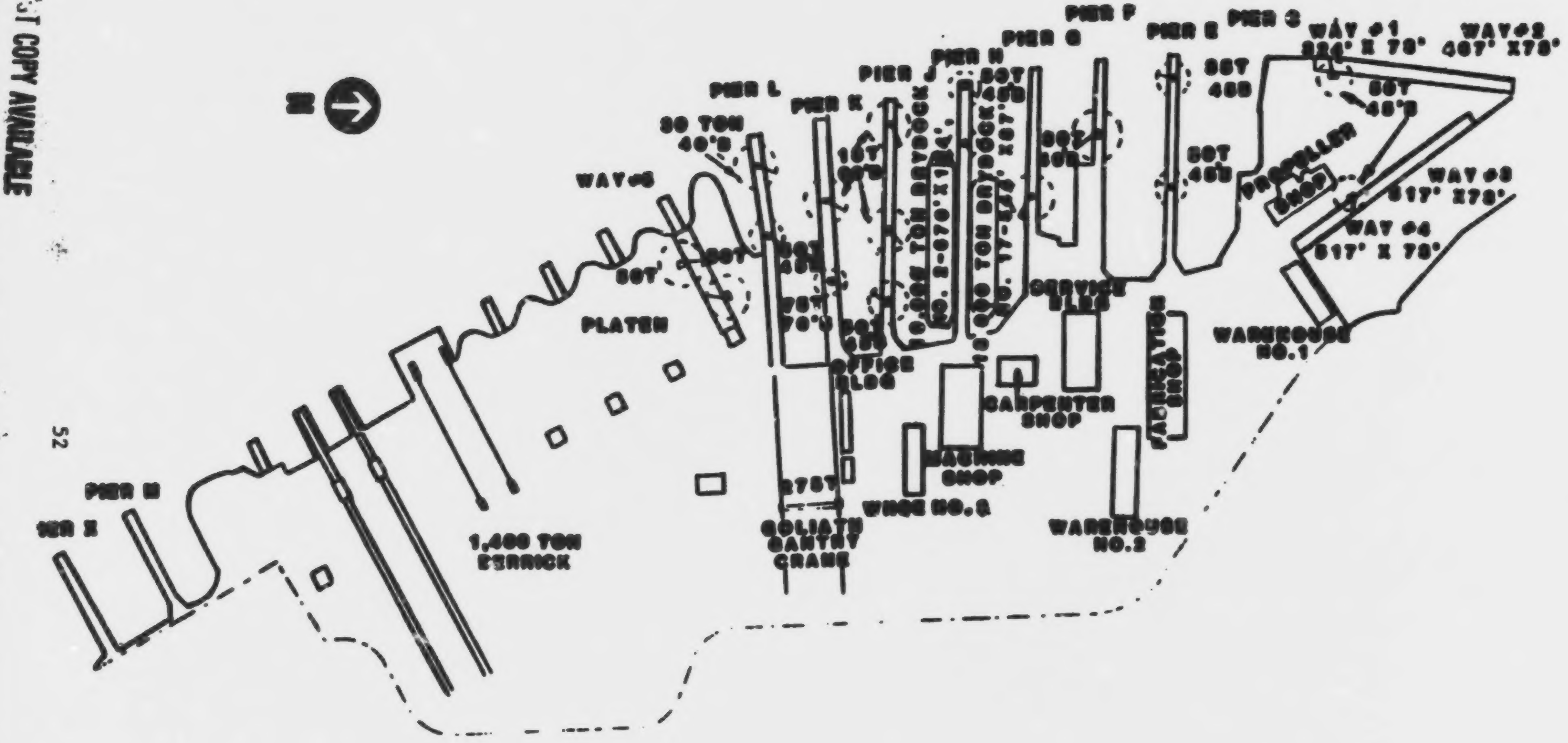


1. Bath Iron Works
2. Robert Dereckter
3. Gen. Dyn.-Elec. Boat
4. Penn Ship (formerly Sun)
5. Beth-Sparrows Point
6. Newport News SB
7. Norfolk SB & DD
8. Tampa Shipyards
9. ADDSCO Industries
10. Ingalls/Litton
11. Avondale Shipyards
12. Beth-Beaumont
13. Todd-Galveston
14. Marathon LeTourneau
15. NASSCO
16. Todd-LA
17. Todd-SF
18. Portland-SRY
19. Tacoma Boat
20. Lockheed
21. Marine Power & Equip.
22. Todd-Seattle
23. Fraser Shipyards
24. Bay Shipbuilding
25. Toledo Shipyard

MAJOR U.S. SHIPBUILDING FACILITIES
BUILDING CAPACITY—SHIPS 475 FEET IN LENGTH OR OVER

1986

Exhibit 1



ADDSCO INDUSTRIES, INC.

Exhibit 2

AVONDALE SHIPYARDS, INC.
MAIN PLANT

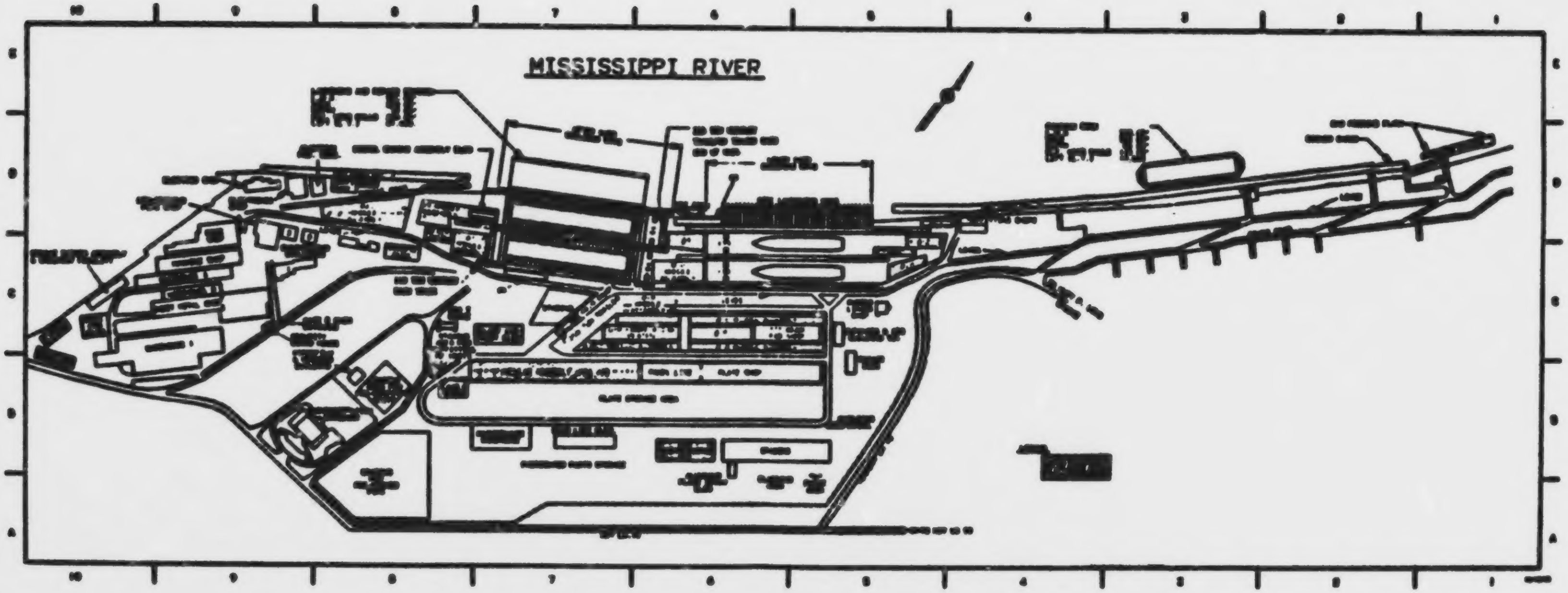
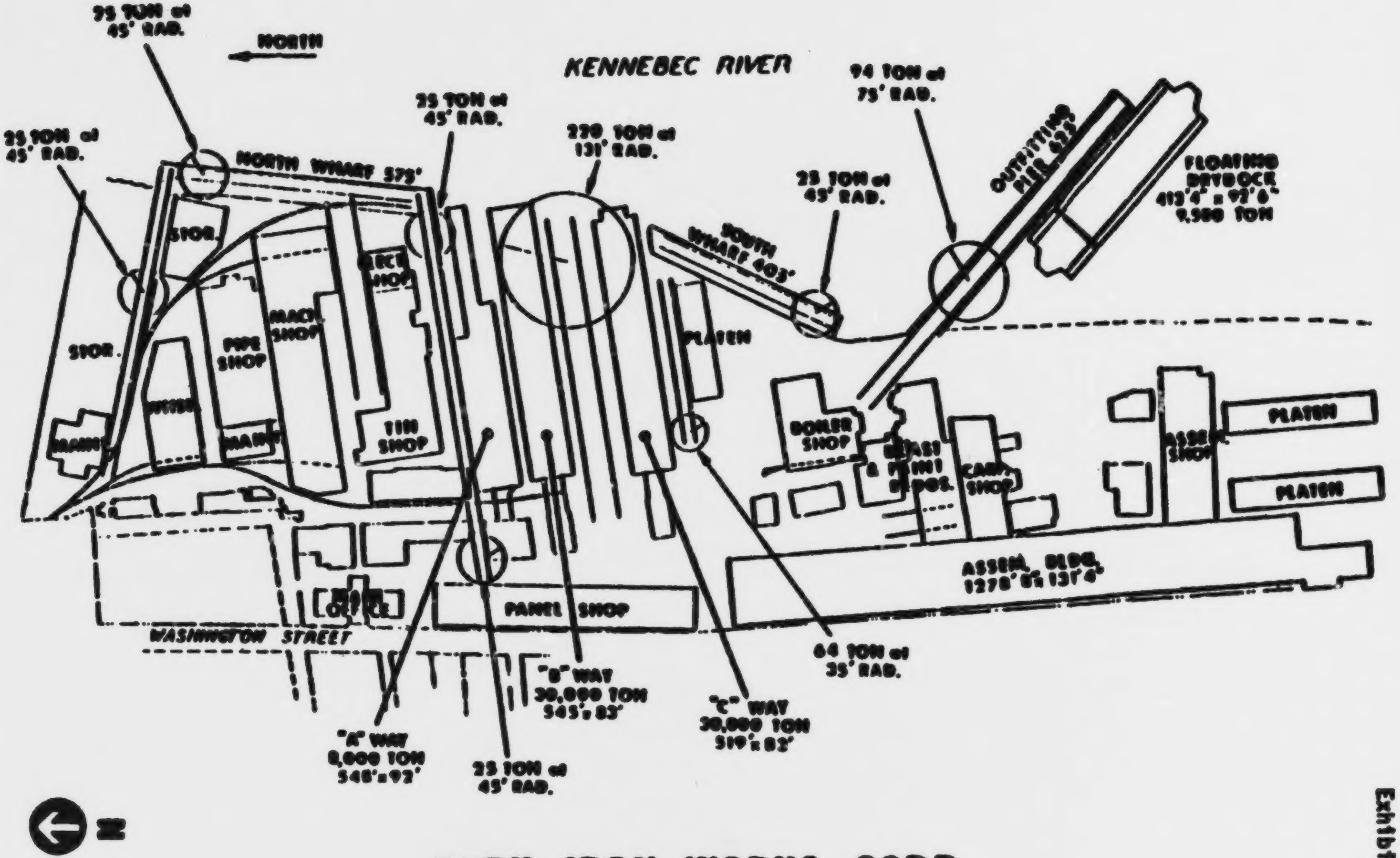


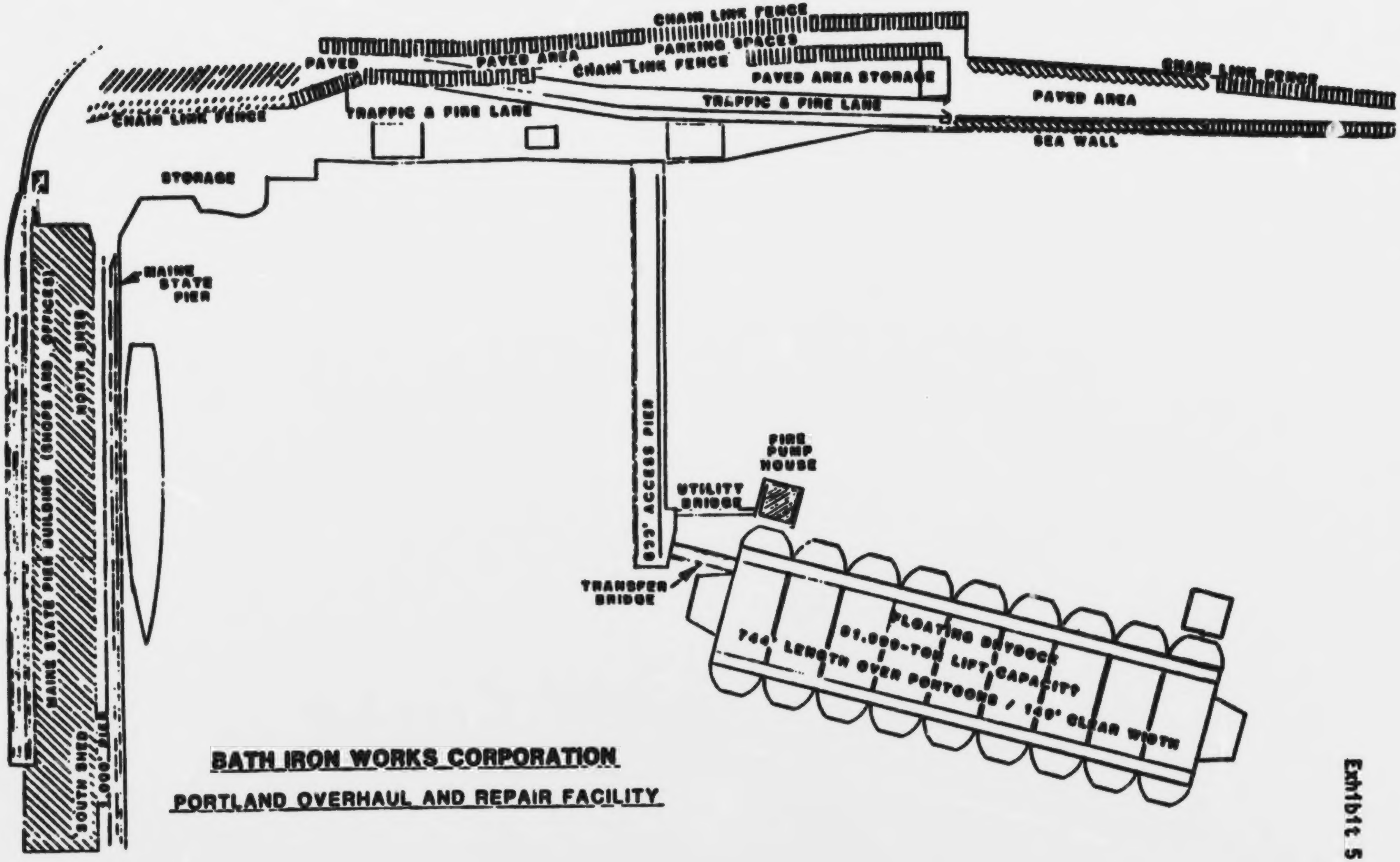
Exhibit 3

BEST COPY AVAILABLE

Exhibit 4



BATH IRON WORKS CORP.



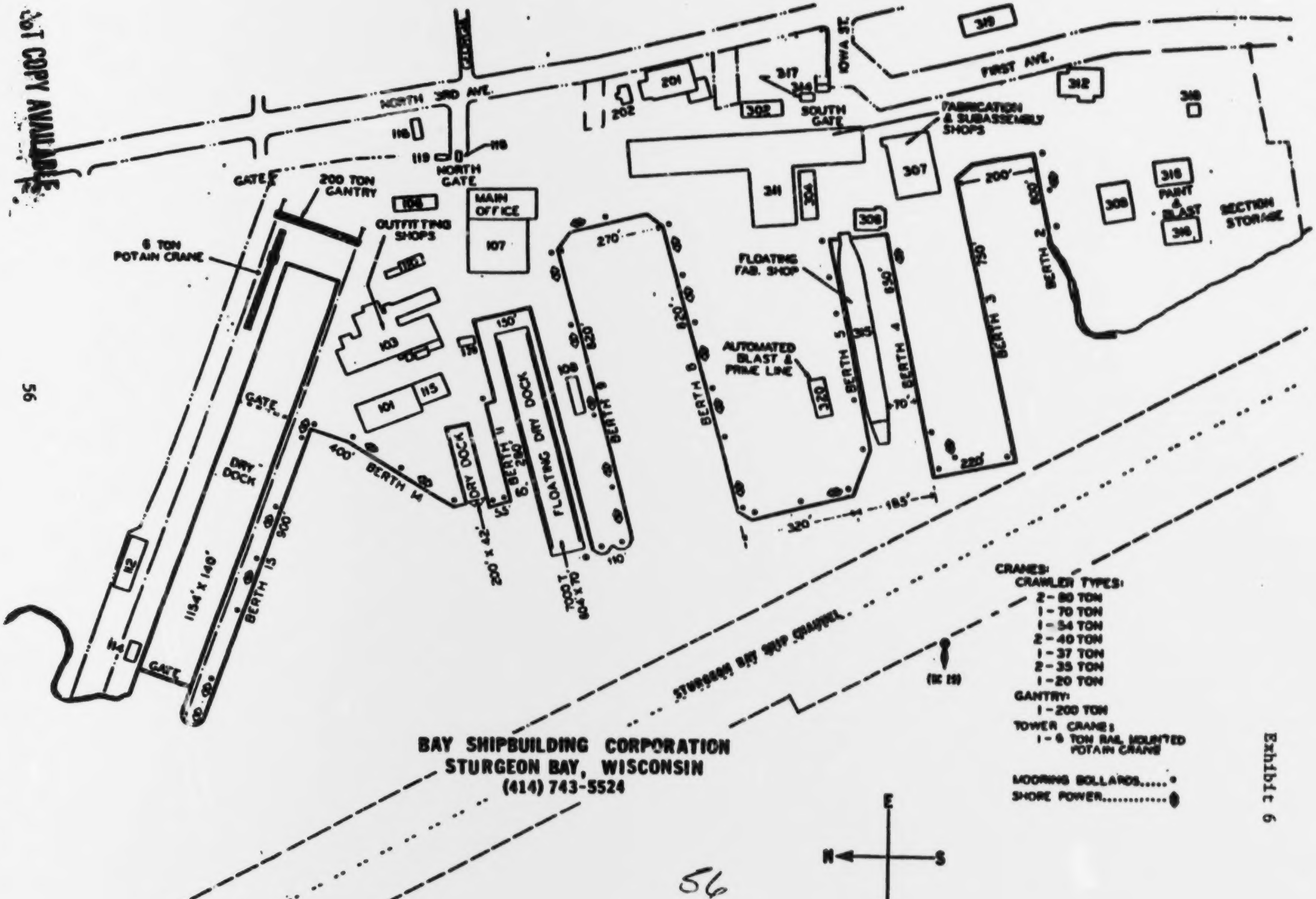
BATH IRON WORKS CORPORATION

PORTLAND OVERHAUL AND REPAIR FACILITY

Exhibit 5

BEST COPY AVAILABLE

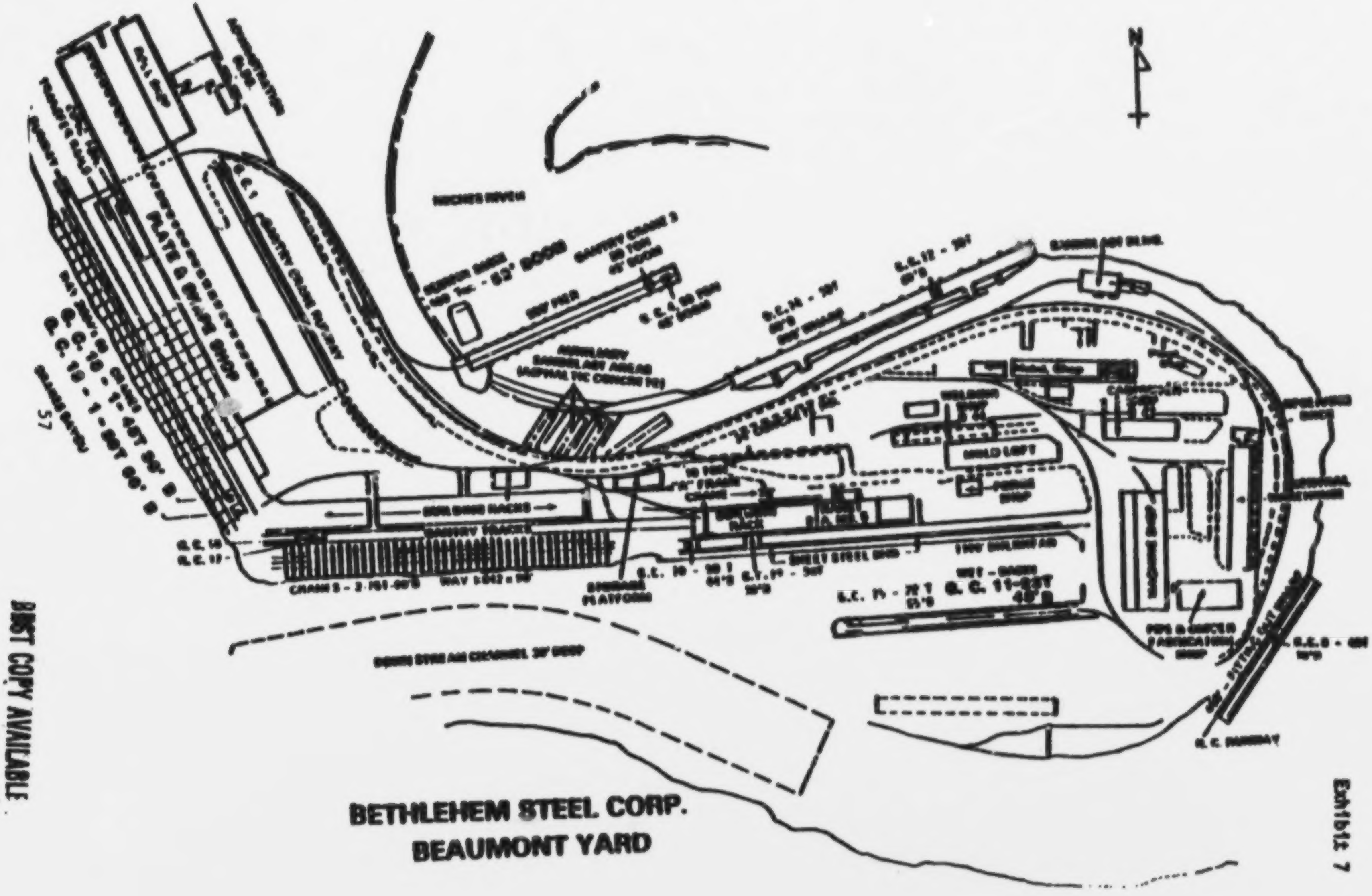
Exhibit 6



BAY SHIPBUILDING CORPORATION
STURGEON BAY, WISCONSIN
(414) 743-5524

56

56



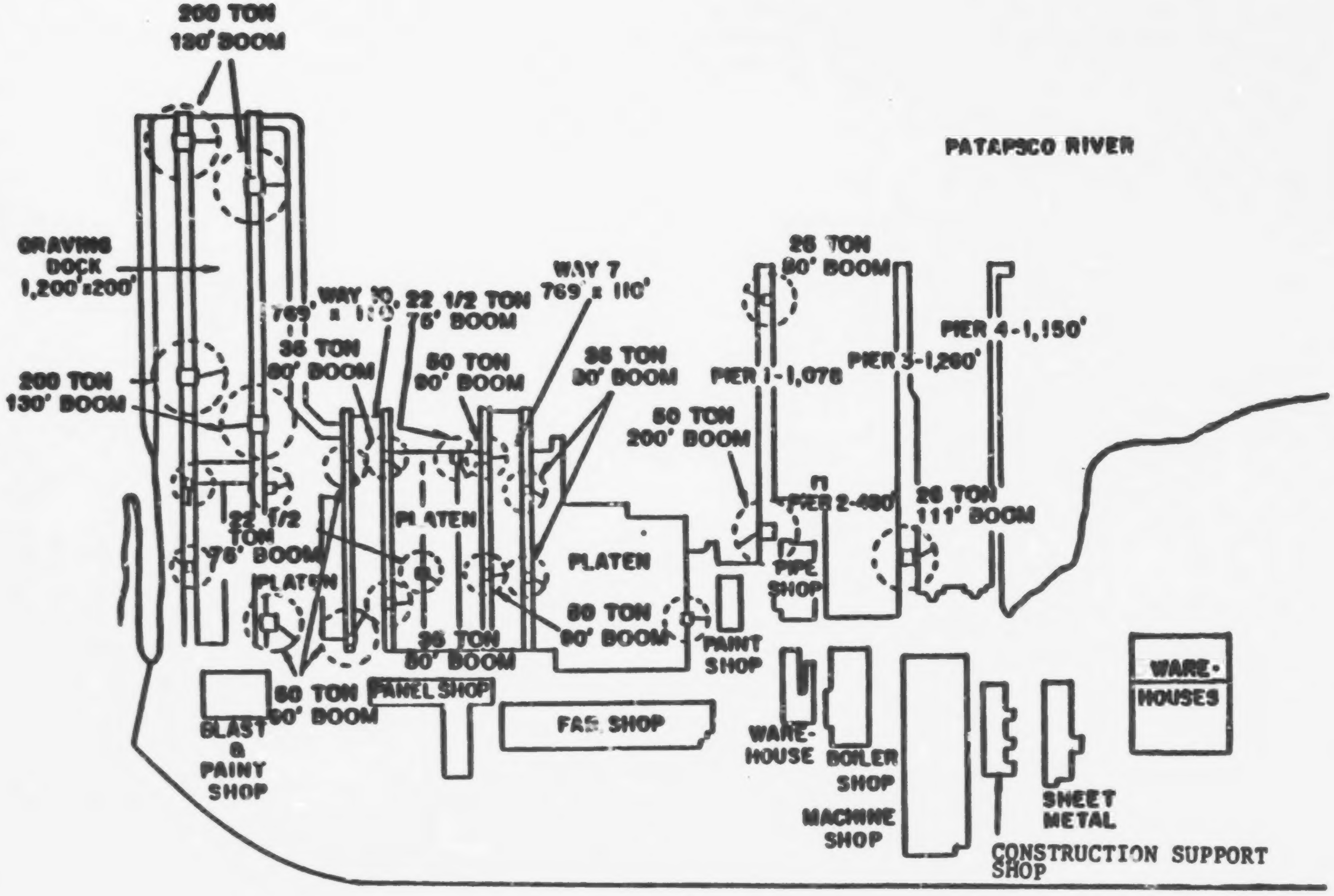
BETHLEHEM STEEL CORP.
BEAUMONT YARD

Exhibit 7

BEST COPY AVAILABLE

57

Exhibit 8

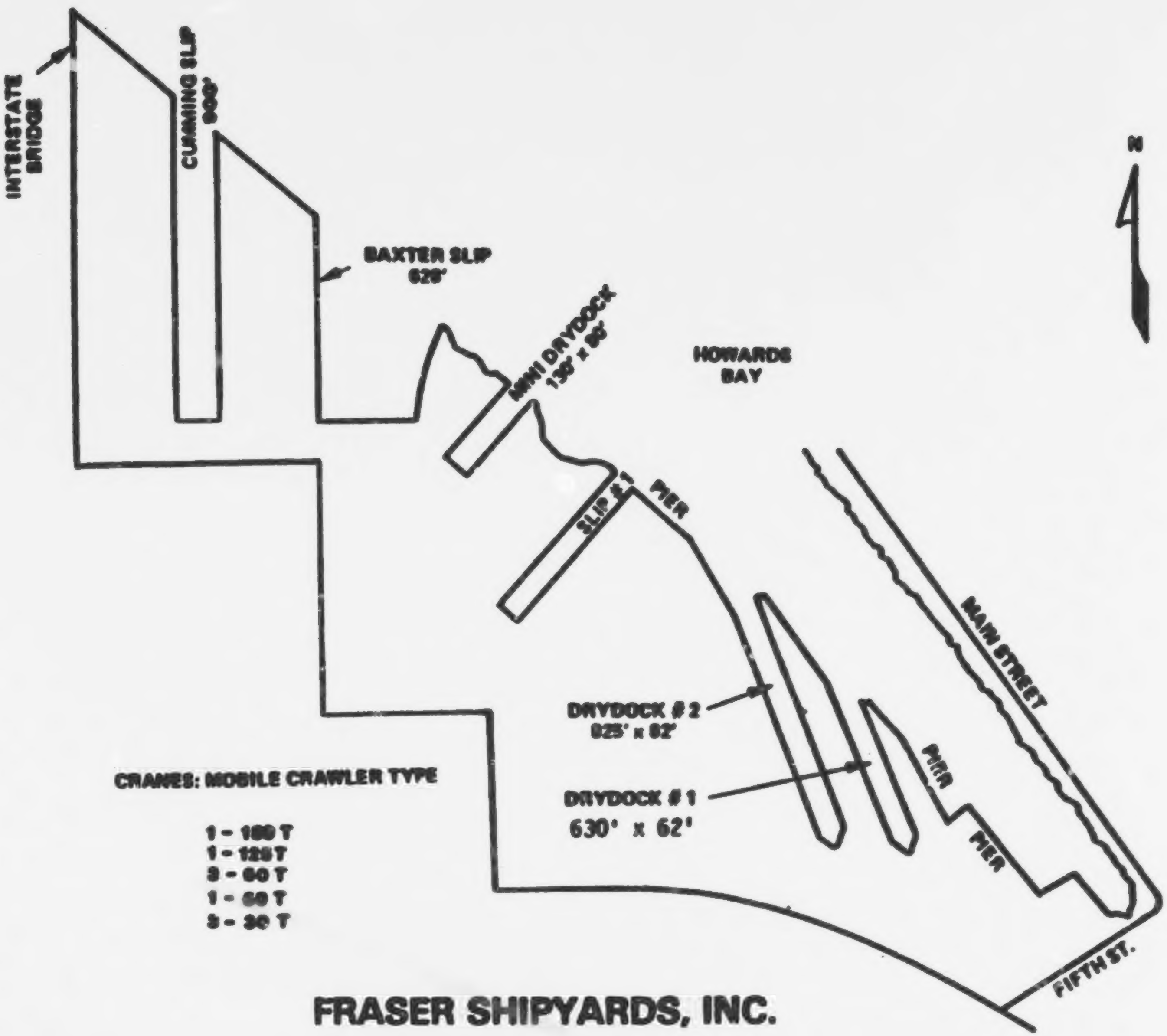


BETHLEHEM STEEL CORPORATION

SPARROWS POINT YARD

58

Exhibit 9



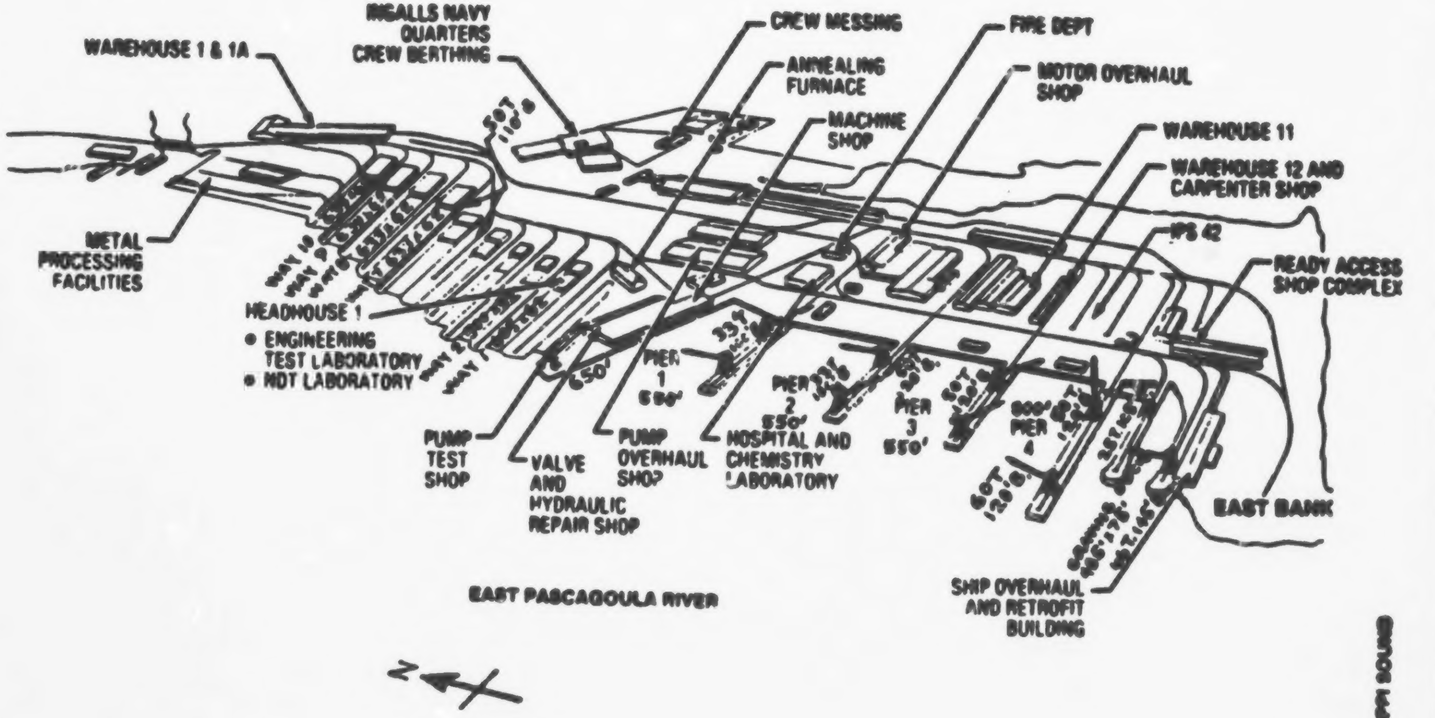
CRANES: MOBILE CRAWLER TYPE

1 - 180 T
1 - 125T
3 - 80 T
1 - 60 T
3 - 30 T

FRASER SHIPYARDS, INC.
SUPERIOR, WISCONSIN

BEST COPY AVAILABLE

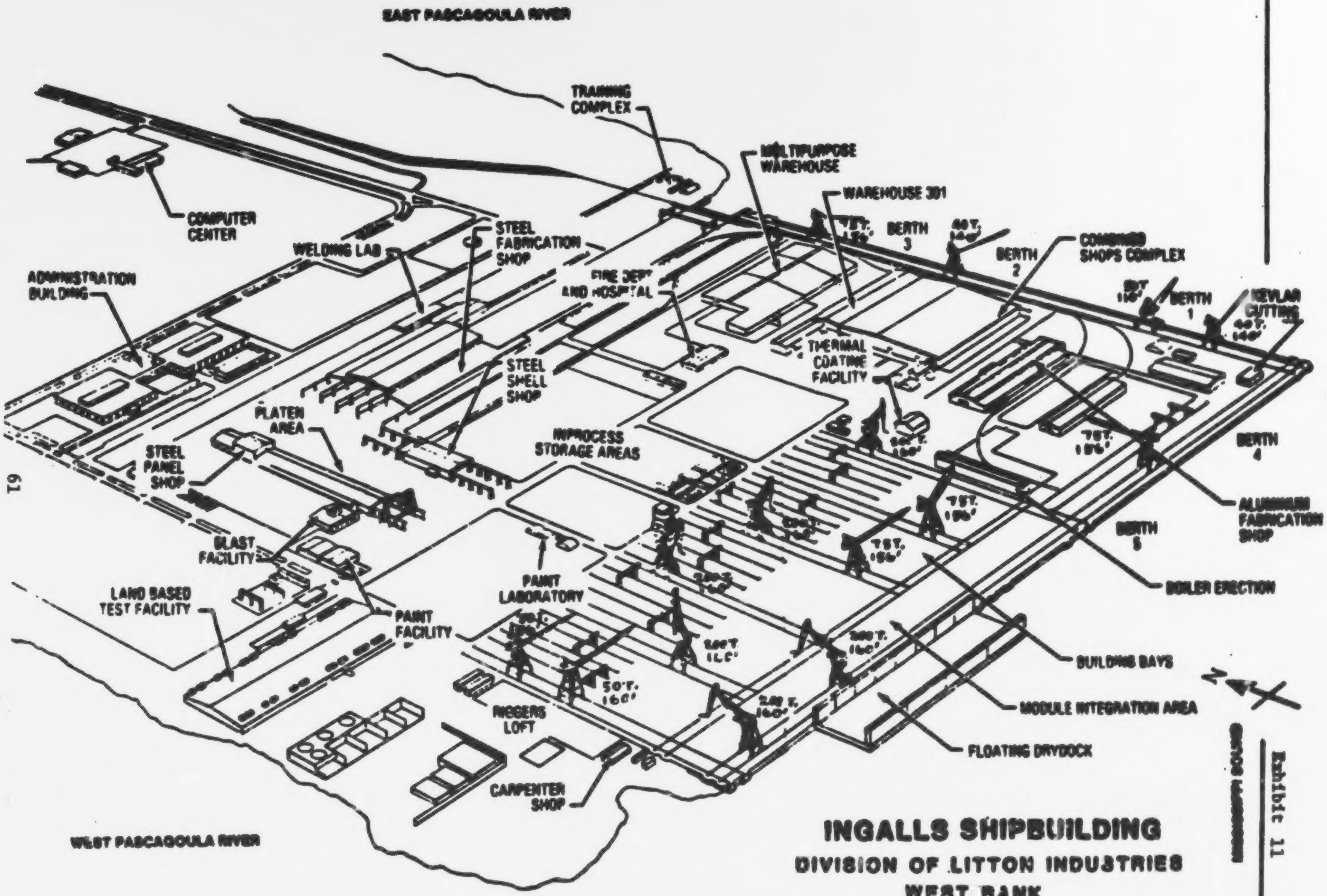
Exhibit 10



INGALLS SHIPBUILDING
DIVISION OF LITTON INDUSTRIES
EAST BANK FACILITY

(67)

Exhibit 11



INGALLS SHIPBUILDING
DIVISION OF LITTON INDUSTRIES
WEST BANK

61

BEST COPY AVAILABLE

BEST COPY AVAILABLE

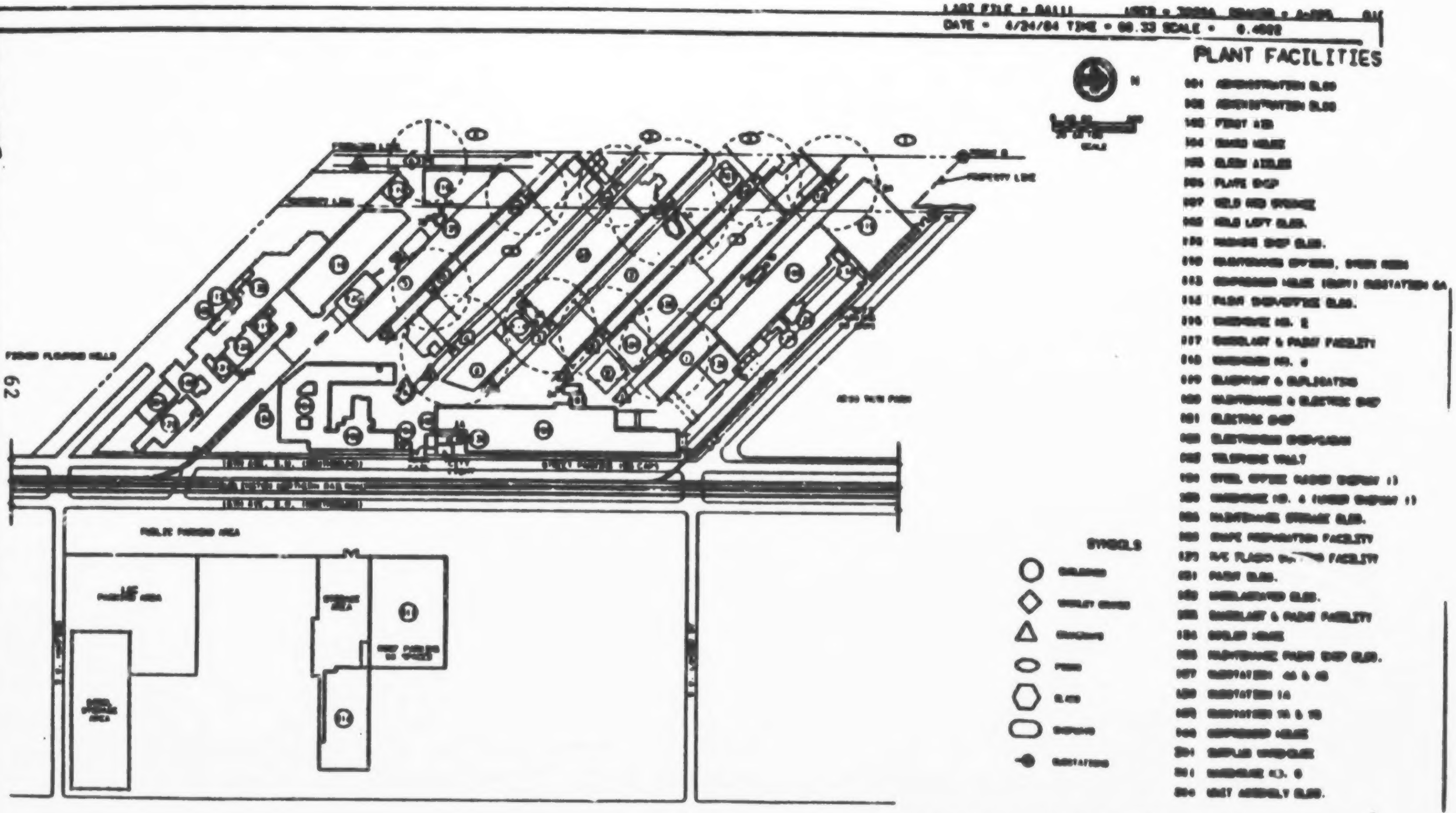


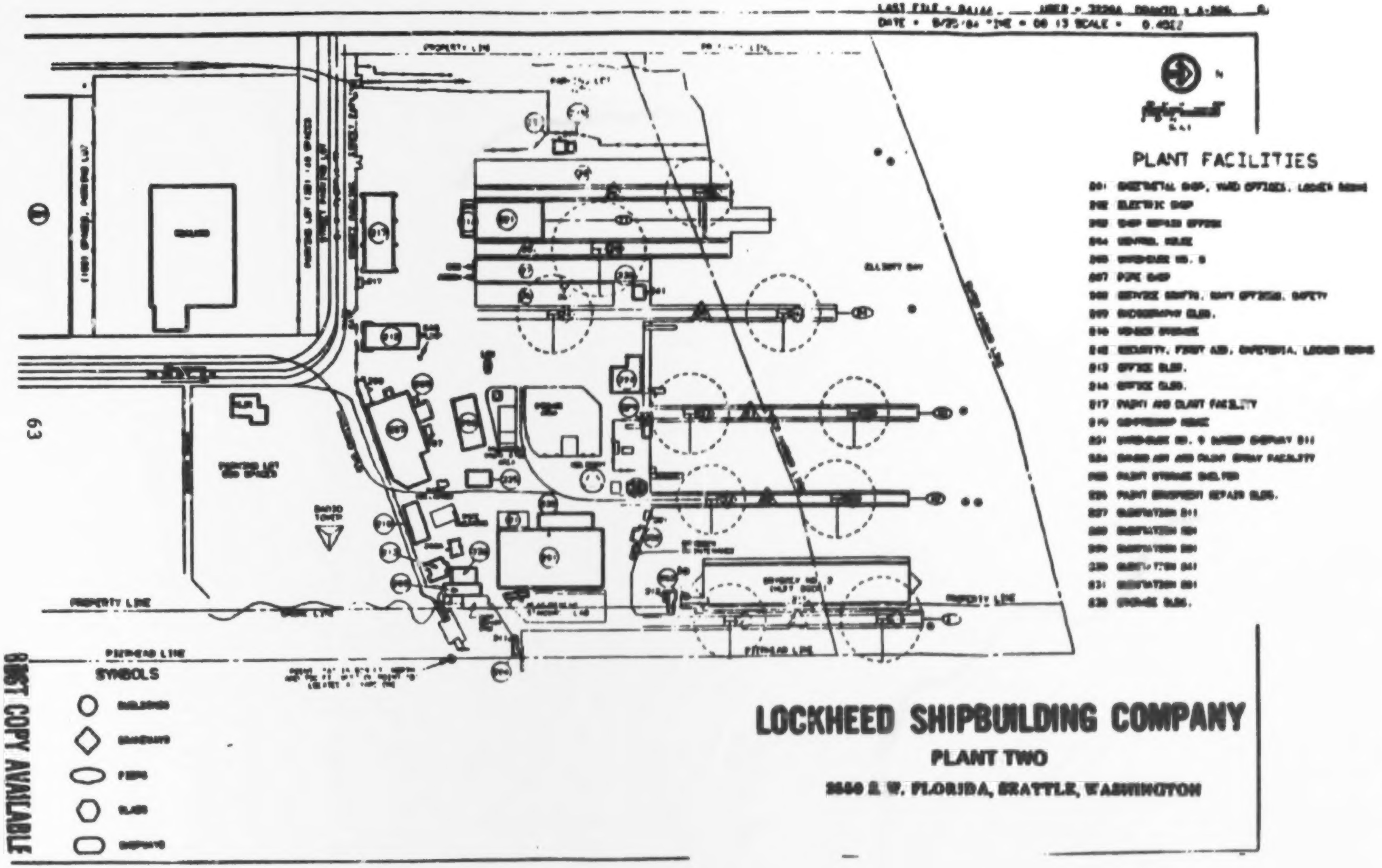
Exhibit 12

LOCKHEED SHIPBUILDING COMPANY

PLANT ONE

2020 16th AVE S.W., SEATTLE, WASHINGTON

Exhibit 13


LAST FILE • [illegible] USER • [illegible] DRAWING • A-[illegible]
DATE • 8/25/84 TIME • 08 13 SCALE • 0.4012
N
PLANT FACILITIES
201 SHEETMETAL SHOP, YARD OFFICES, LOCKER ROOMS
202 ELECTRIC SHOP
203 SHIP REPAIR OFFICE
204 [illegible]
205 WAREHOUSE NO. 5
207 PIPE SHOP
208 SERVICE CONTR., NAVY OFFICES, SAFETY
209 RADIOGRAPHY BLDG.
210 VENDOR STORAGE
212 SECURITY, FIRST AID, CAFETERIA, LOCKER ROOMS
213 OFFICE BLDG.
214 OFFICE BLDG.
217 PAINT AND BLAST FACILITY
219 COMPRESSOR HOUSE
221 WAREHOUSE NO. 9 [illegible] 211
224 [illegible] AND PAINT SPRAY FACILITY
225 PAINT STORAGE SHELTER
226 PAINT EQUIPMENT REPAIR BLDG.
227 SUBSTATION 211
228 SUBSTATION [illegible]
229 SUBSTATION [illegible]
230 SUBSTATION [illegible]
231 SUBSTATION [illegible]
232 STORAGE BLDG.
PROPERTY LINE
PIERHEAD LINE
SHORE LINE
ELLIOTT BAY
SYMBOLS
BUILDINGS
PIERS

LOCKHEED SHIPBUILDING COMPANY

PLANT TWO

2550 S. W. FLORIDA, SEATTLE, WASHINGTON

BEST COPY AVAILABLE

BEST COPY AVAILABLE

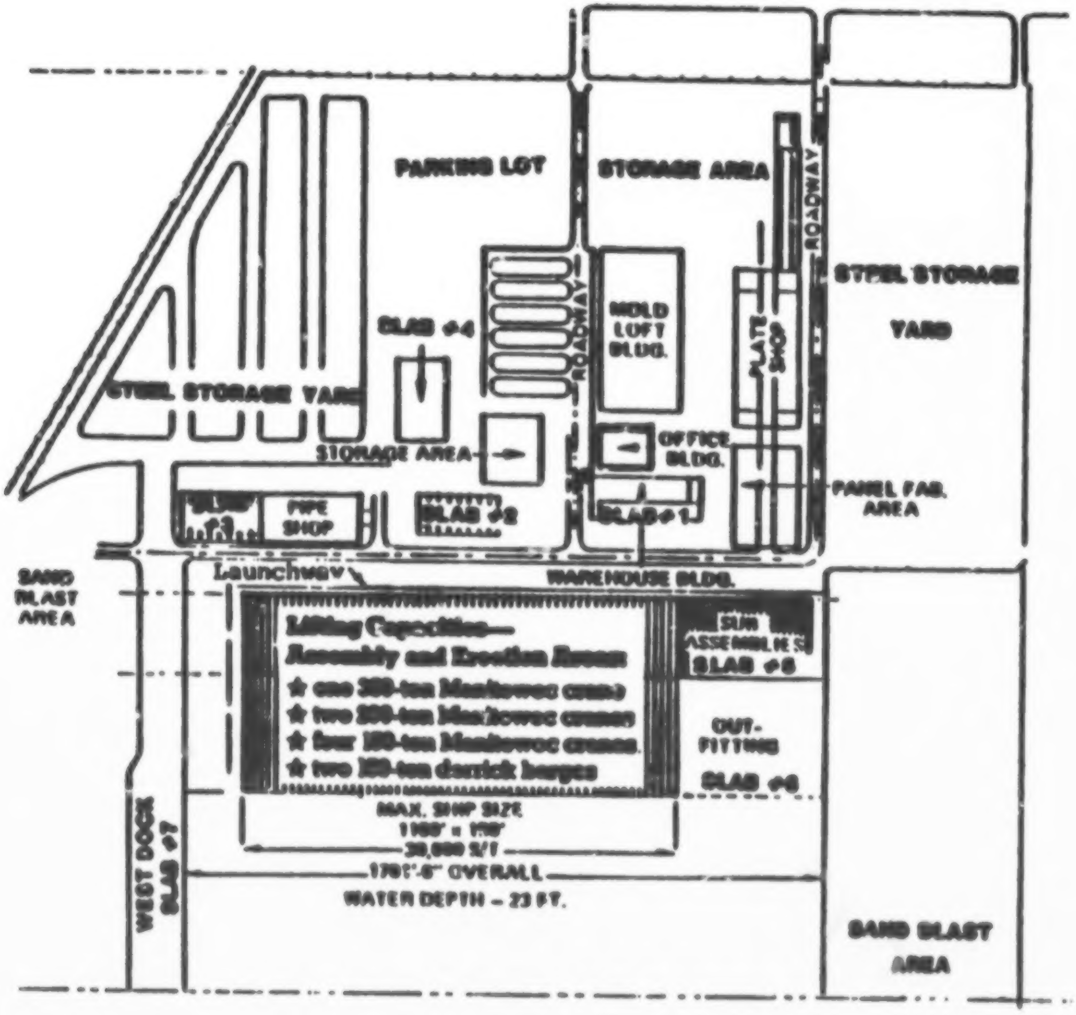
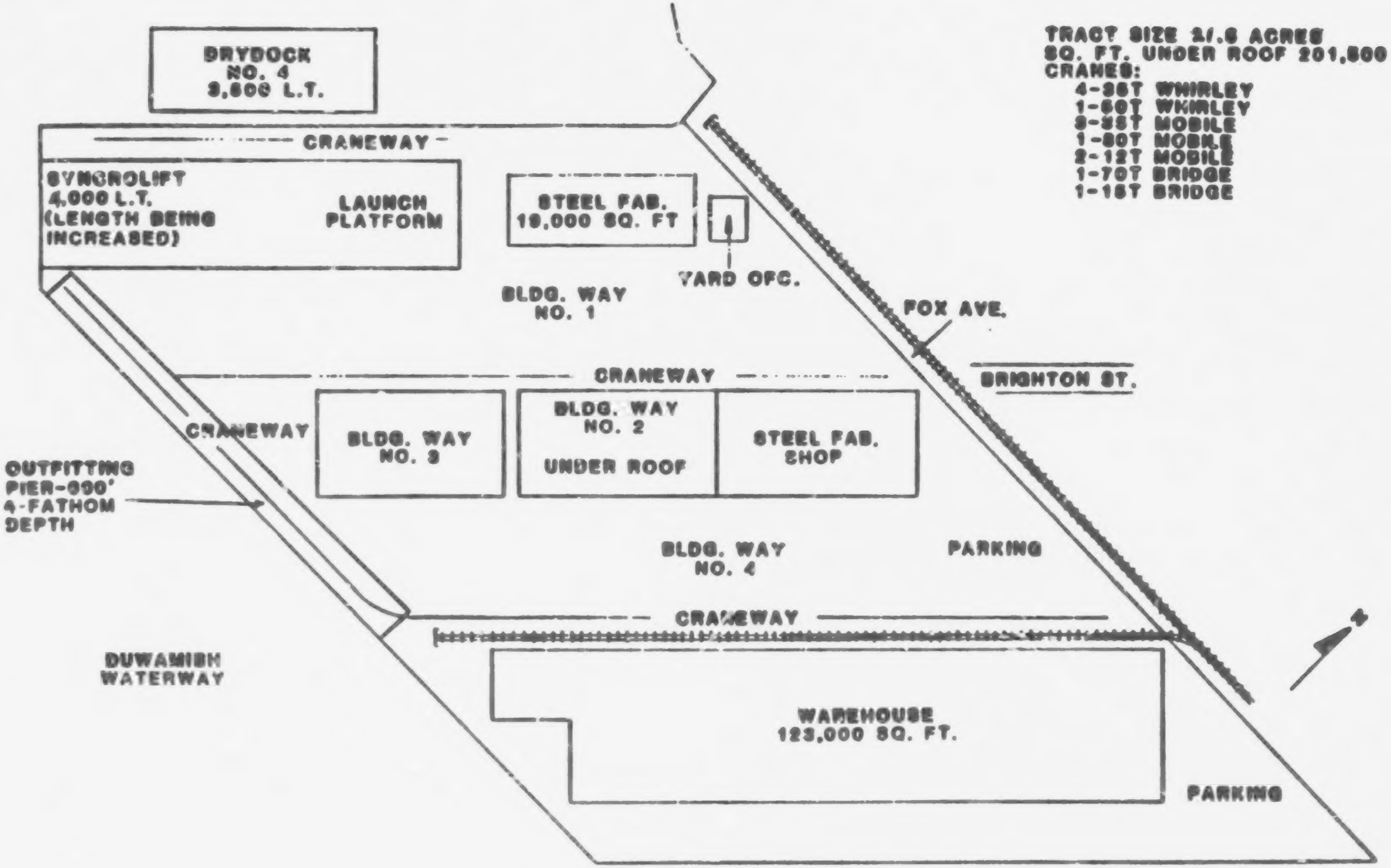


Exhibit 14

MARATHON LeTOURNEAU CO.
GULF MARINE DIVISION

Exhibit 15



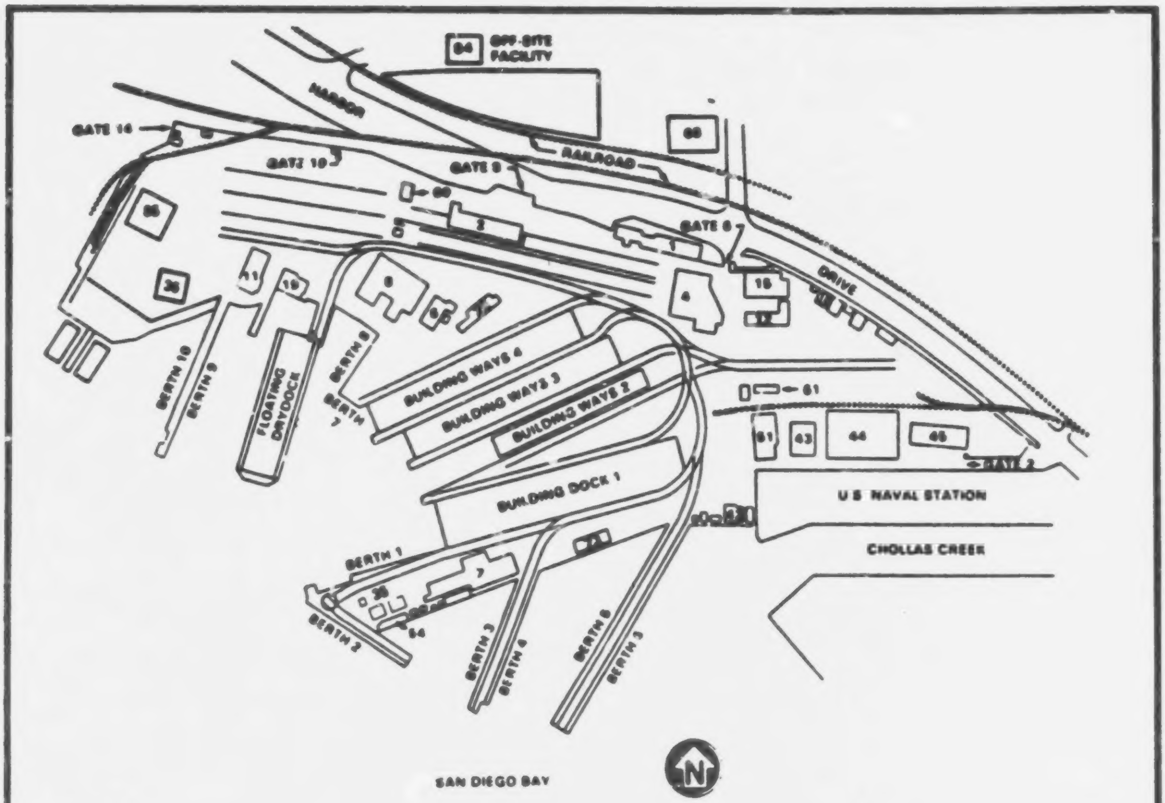
MARINE POWER & EQUIPMENT CO.

YARD 4

BEST COPY AVAILABLE

Exhibit 16

NASSCO SHIPYARD LAYOUT



BLDG. NO.	
1	ADMINISTRATION BUILDING
2	PLATE SHOP
4	PIPE SHOP
6	INSTRUMENT SHOP/MOTOR SHOP/REPAIR ELECTRICAL SHOP
7	SHEETMETAL SHOP/NEW CONSTRUCTION ELECTRICAL SHOP
8	MACHINE SHOP/REPAIR DEPARTMENT/REPAIR PRODUCTION MANAGEMENT
11	STORAGE
12	MAINTENANCE
15	ADMINISTRATION ANNEX
19	CARPENTER SHOP
26	PLATEN OFFICE

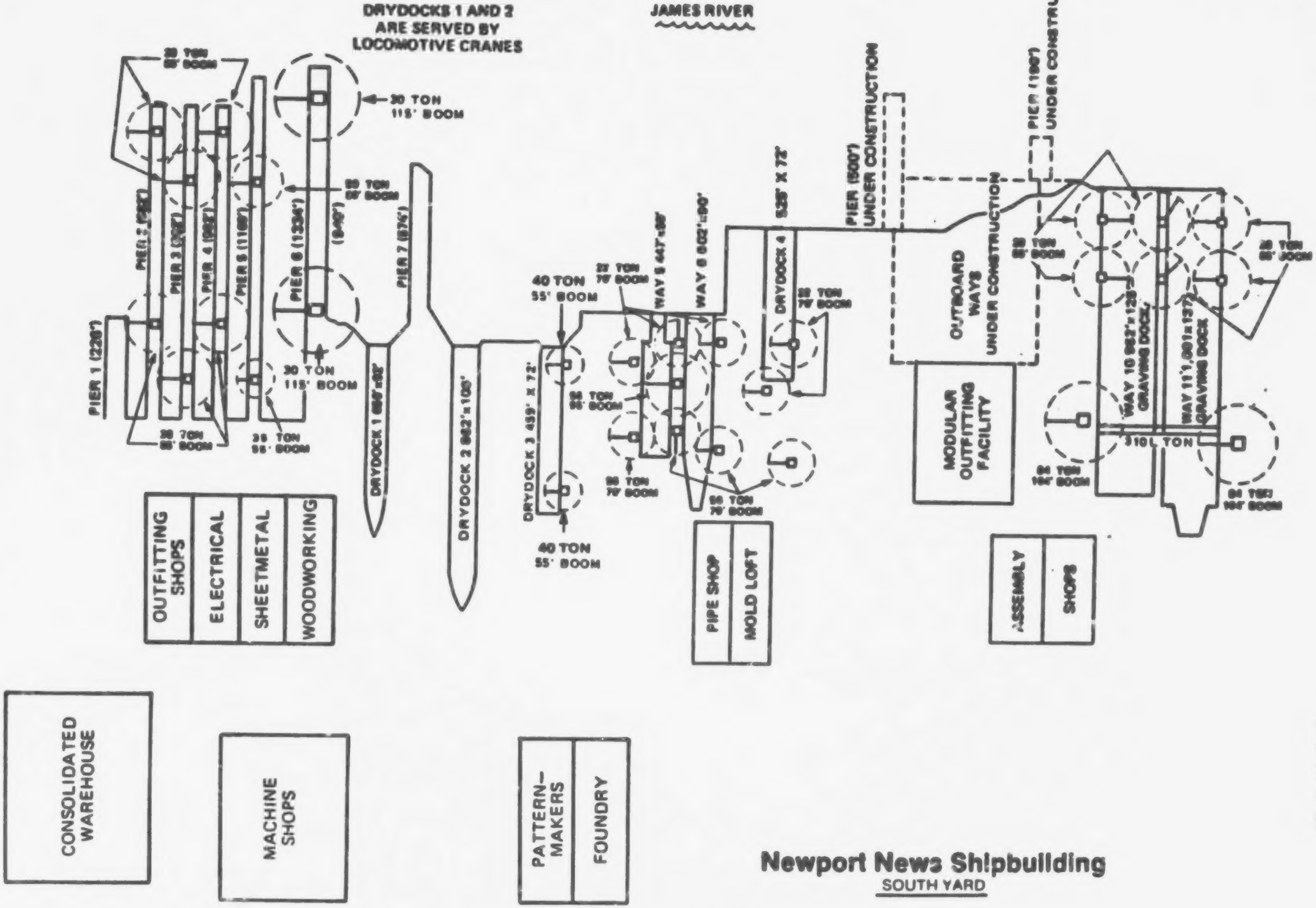
BLDG. NO.	
35	GOVERNMENT TECHNICAL REPRESENTATIVE/ SHIP'S FORCE WORK AND STORAGE SUPPORT
36	COMBAT SYSTEMS SHOP
42	YARD CONFERENCE ROOM
43	WAREHOUSE
44	WAREHOUSE
45	WAREHOUSE
51	ENGINEERING
54	QUALITY ASSURANCE
60	FLAME PLANER SHED
61	WELDING OFFICE
68	INFORMATION SYSTEMS
84	WAREHOUSE
85	GRITBLAST & PRECONSTRUCTION PRIMER SHOP

DOCKS AND WAYS

BUILDING DOCK 1	1000' × 176'
BUILDING WAYS 2	675' × 96'
BUILDING WAYS 3	906' × 115'
BUILDING WAYS 4	906' × 115'
FLOATING DRY DOCK	585' × 170' (140' CLEAR BETWEEN WINGWALLS)

BERTHS

BERTH 1	600' × 30' DEEP
BERTH 2	900' × 30' DEEP
BERTH 3	560' × 30' DEEP
BERTH 4	625' × 30' DEEP
BERTH 5	950' × 35' DEEP
BERTH 6	1000' × 35' DEEP
BERTH 7	150' X 23' DEEP
BERTH 8	300' × 23' DEEP
BERTH 9	700' × 28' DEEP
BERTH 10	650' × 28' DEEP

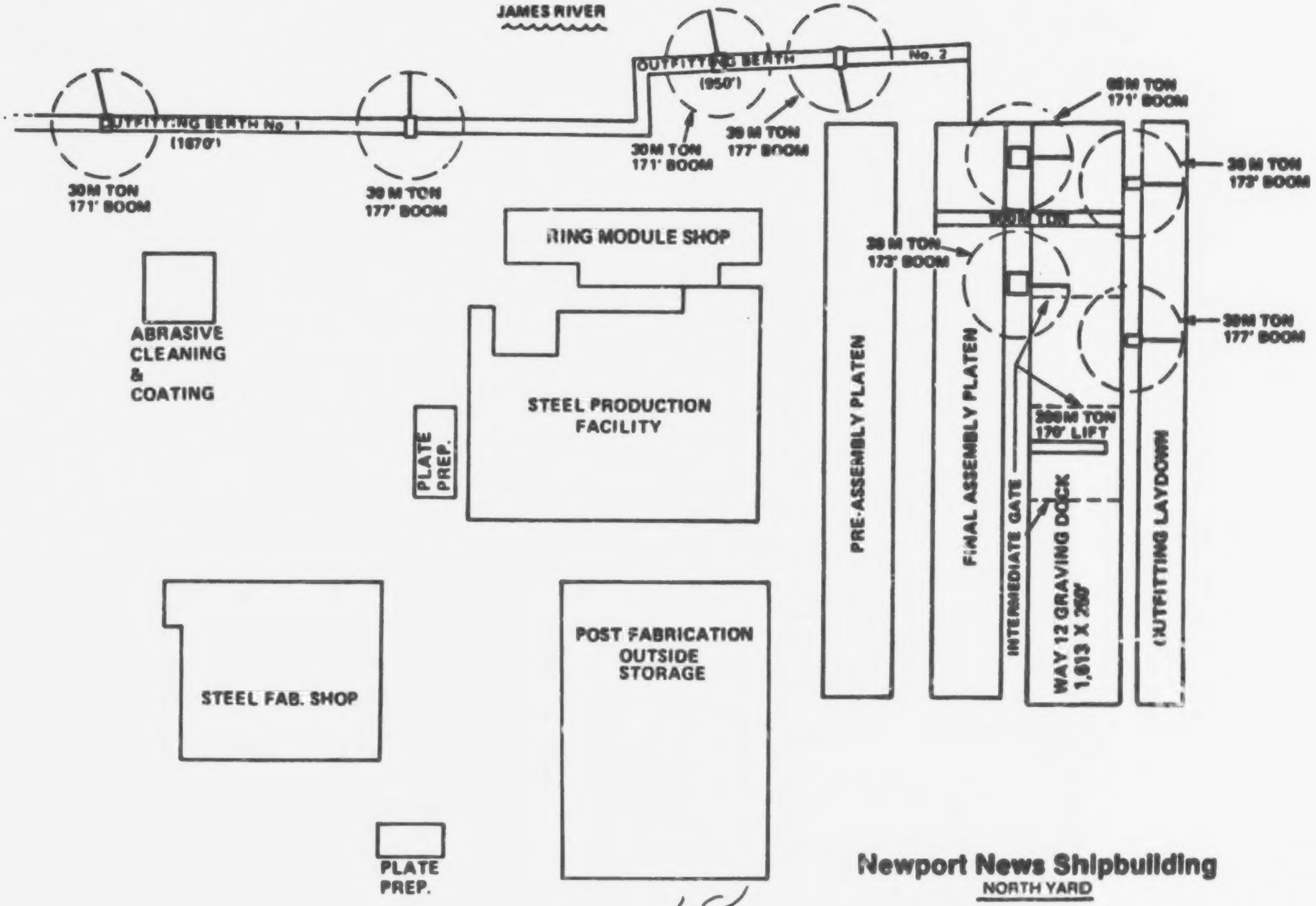


Newport News Shipbuilding

SOUTH YARD

Exhibit 17

Exhibit 18



Newport News Shipbuilding
NORTH YARD

68

EXHIBIT 19

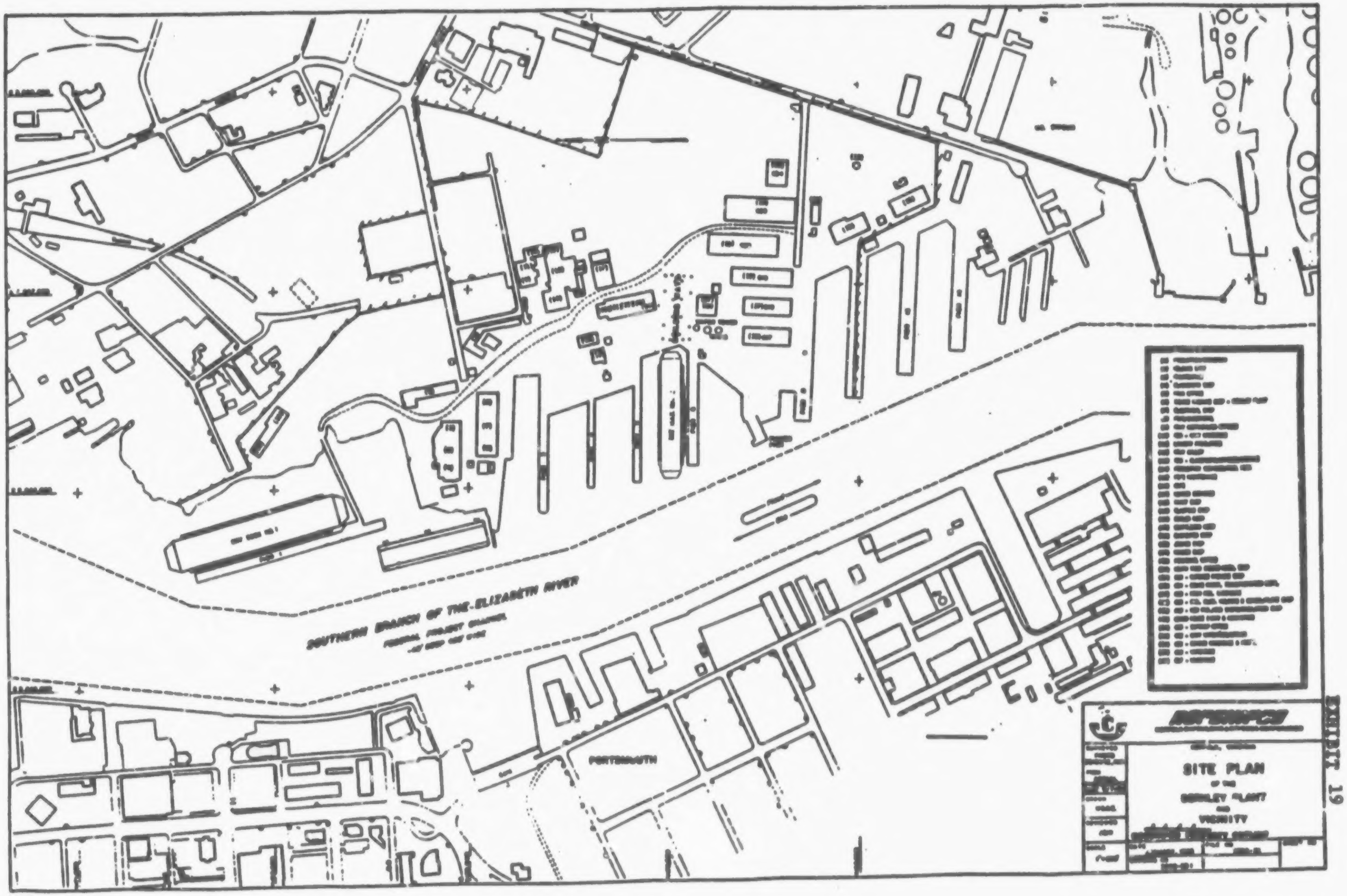
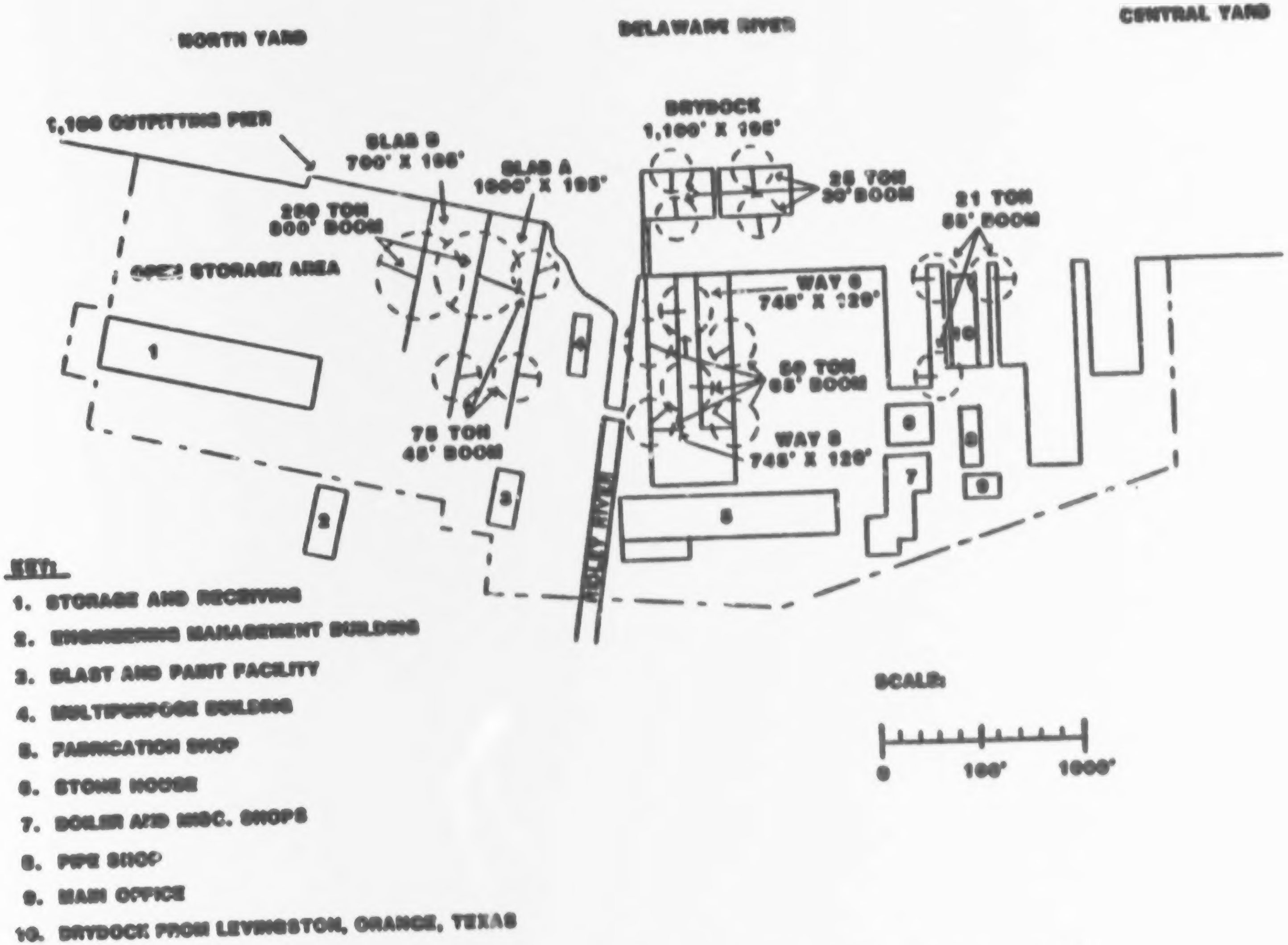
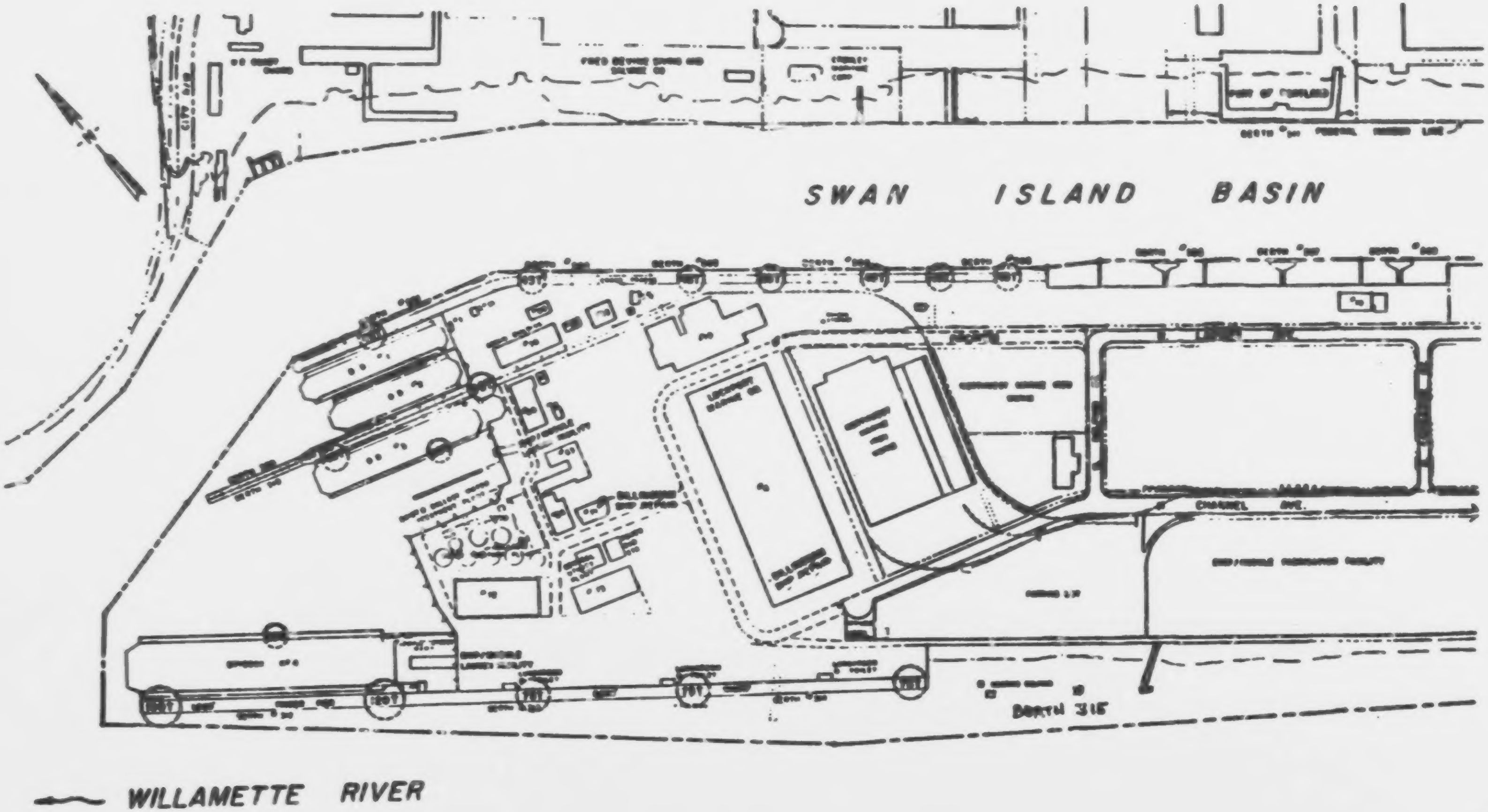

SOUTHERN BRANCH OF THE ELIZABETH RIVER
FEDERAL PROJECT CHANNEL
PORTSMOUTH
SITE PLAN
OF THE
BERKLEY PLANT
AND
VICINITY

Exhibit 20



PENNSYLVANIA SHIPBUILDING CO.

Exhibit 21



PORTLAND SHIP REPAIR YARD

Port of Portland

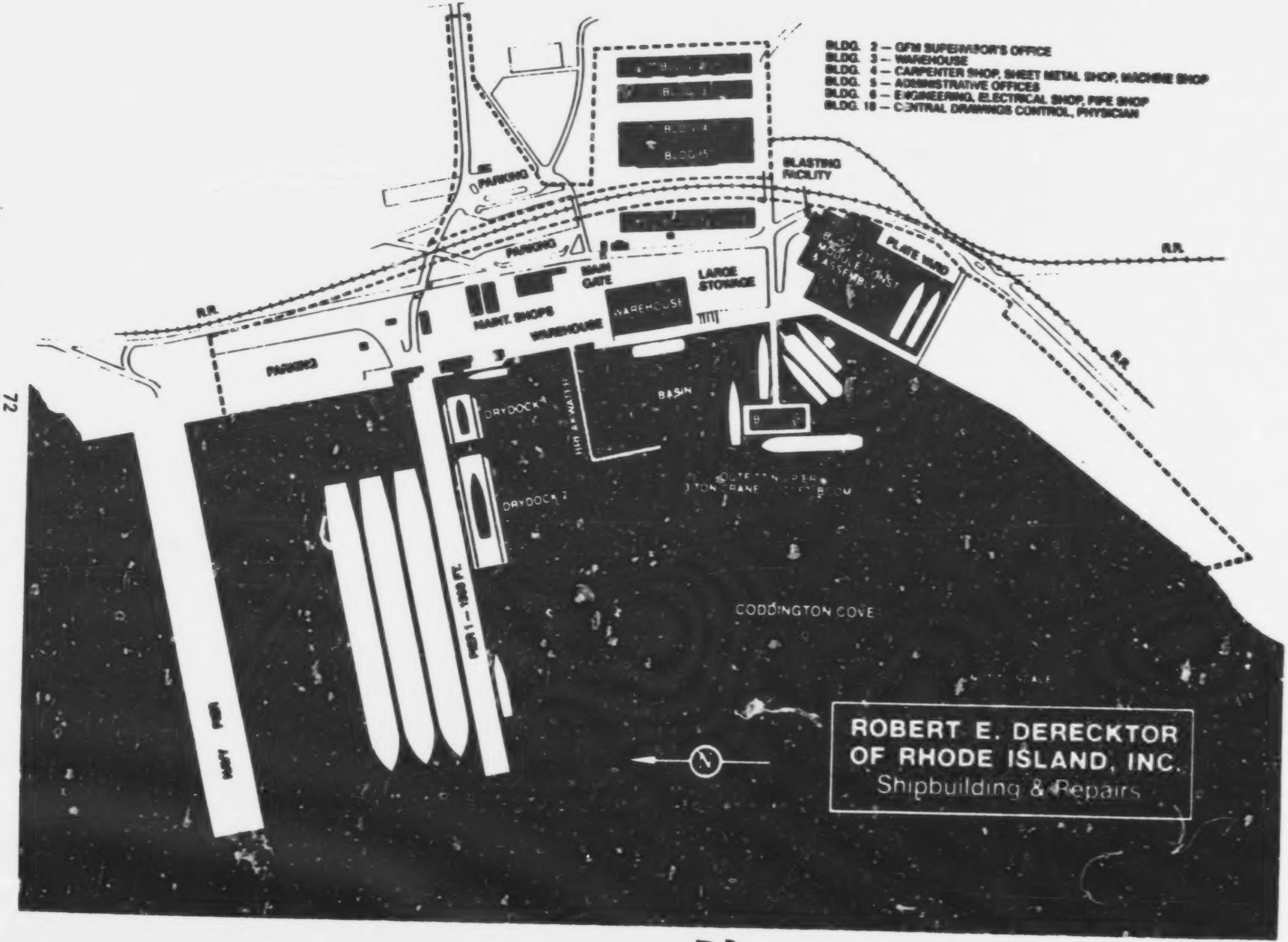


Exhibit 22

72

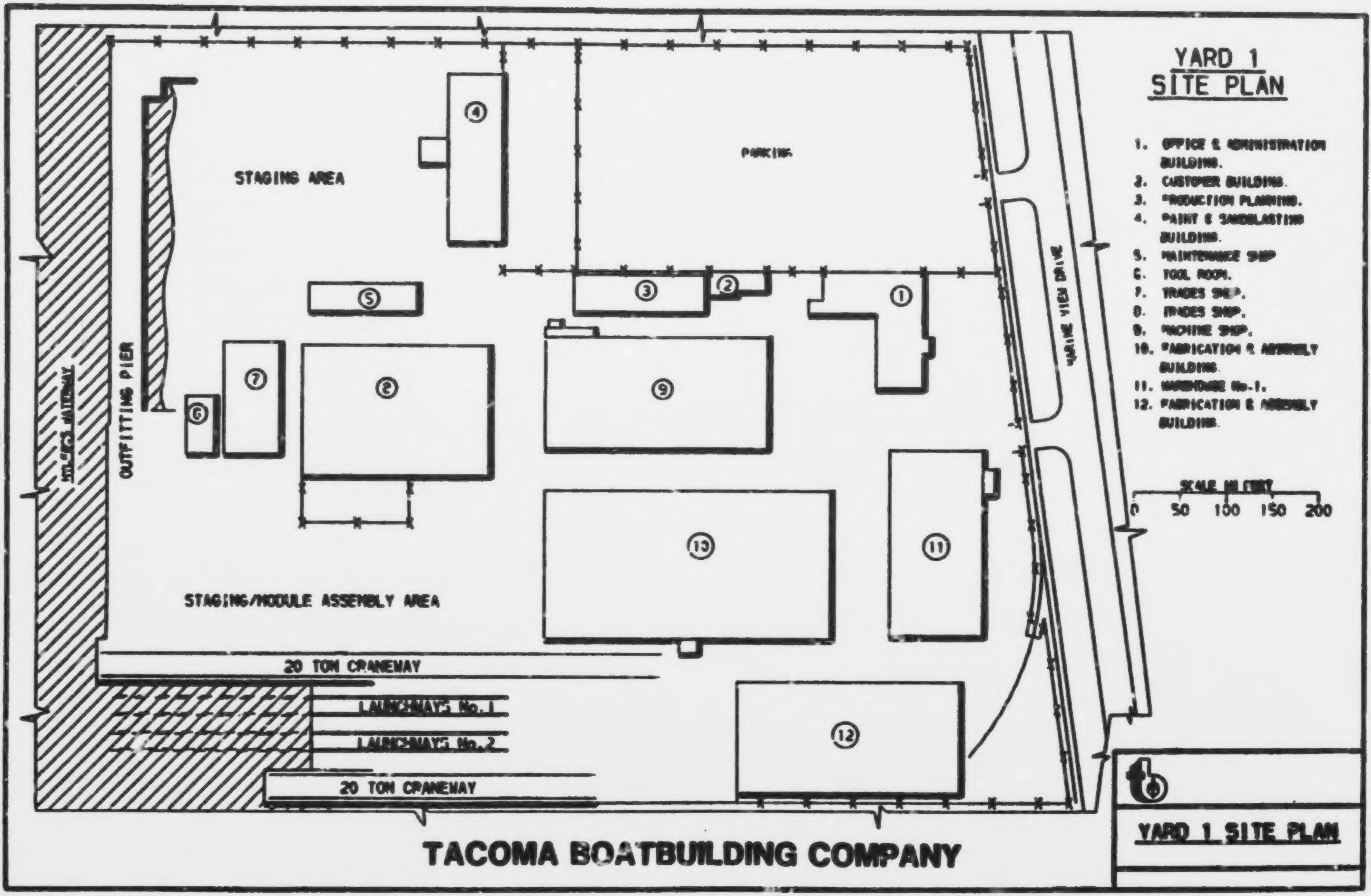

YARD 1
SITE PLAN
1. OFFICE & ADMINISTRATION BUILDING.
2. CUSTOMER BUILDING.
3. PRODUCTION PLANNING.
4. PAINT & SANDBLASTING BUILDING.
5. MAINTENANCE SHOP
6. TOOL ROOM.
7. TRADES SHOP.
8. TRADES SHOP.
9. MACHINE SHOP.
10. FABRICATION & ASSEMBLY BUILDING.
11. WAREHOUSE No.1.
12. FABRICATION & ASSEMBLY BUILDING.
SCALE IN FEET
0
50
100
150
200
PARKING
STAGING AREA
①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
MARINE VIEW DRIVE
HYLEBOS WATERWAY
OUTFITTING PIER
STAGING/MODULE ASSEMBLY AREA
20 TON CRANEWAY
LAUNCHWAYS No.1
LAUNCHWAYS No.2
20 TON CRANEWAY
TACOMA BOATBUILDING COMPANY
YARD 1 SITE PLAN

Exhibit 23

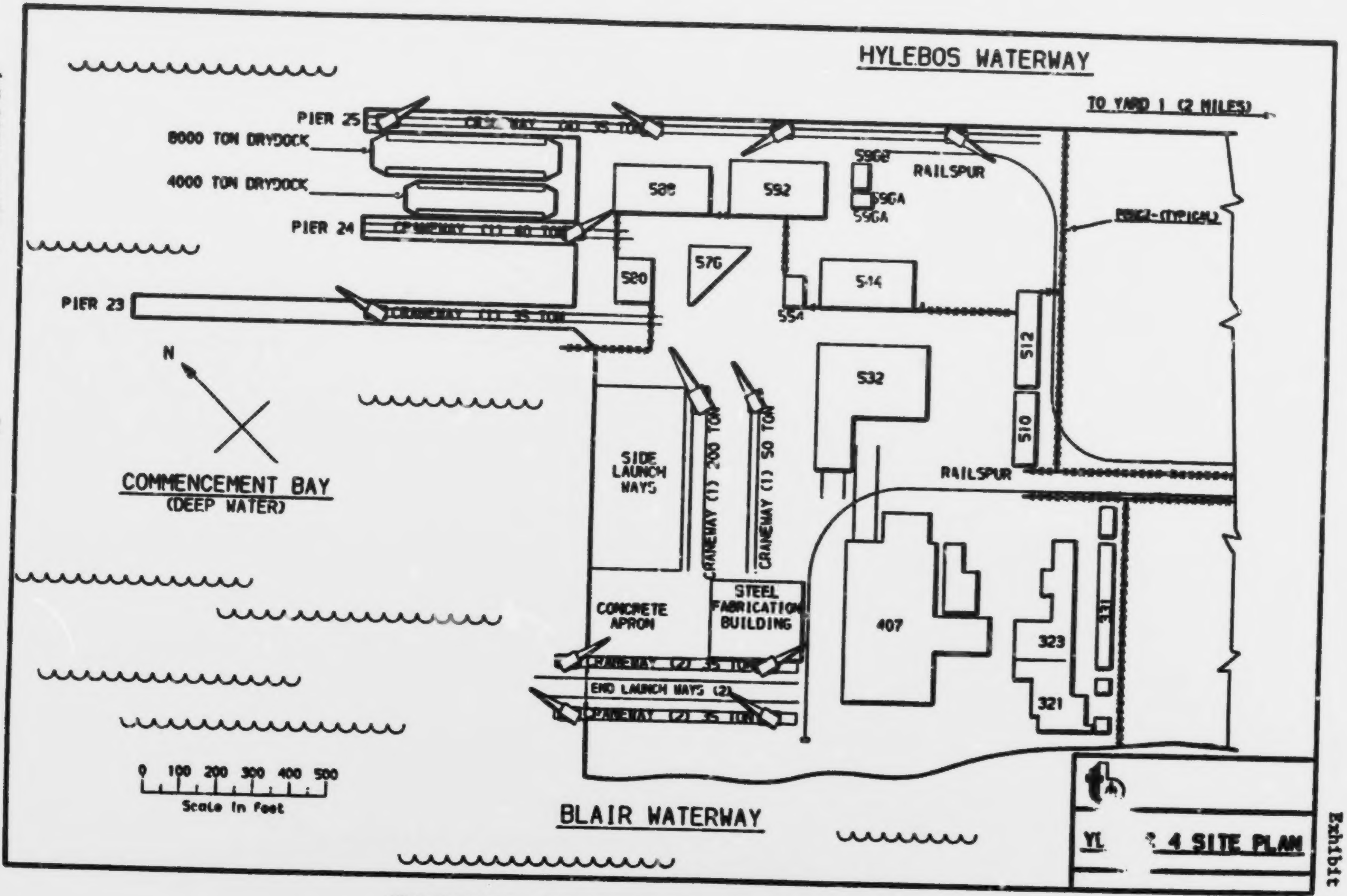
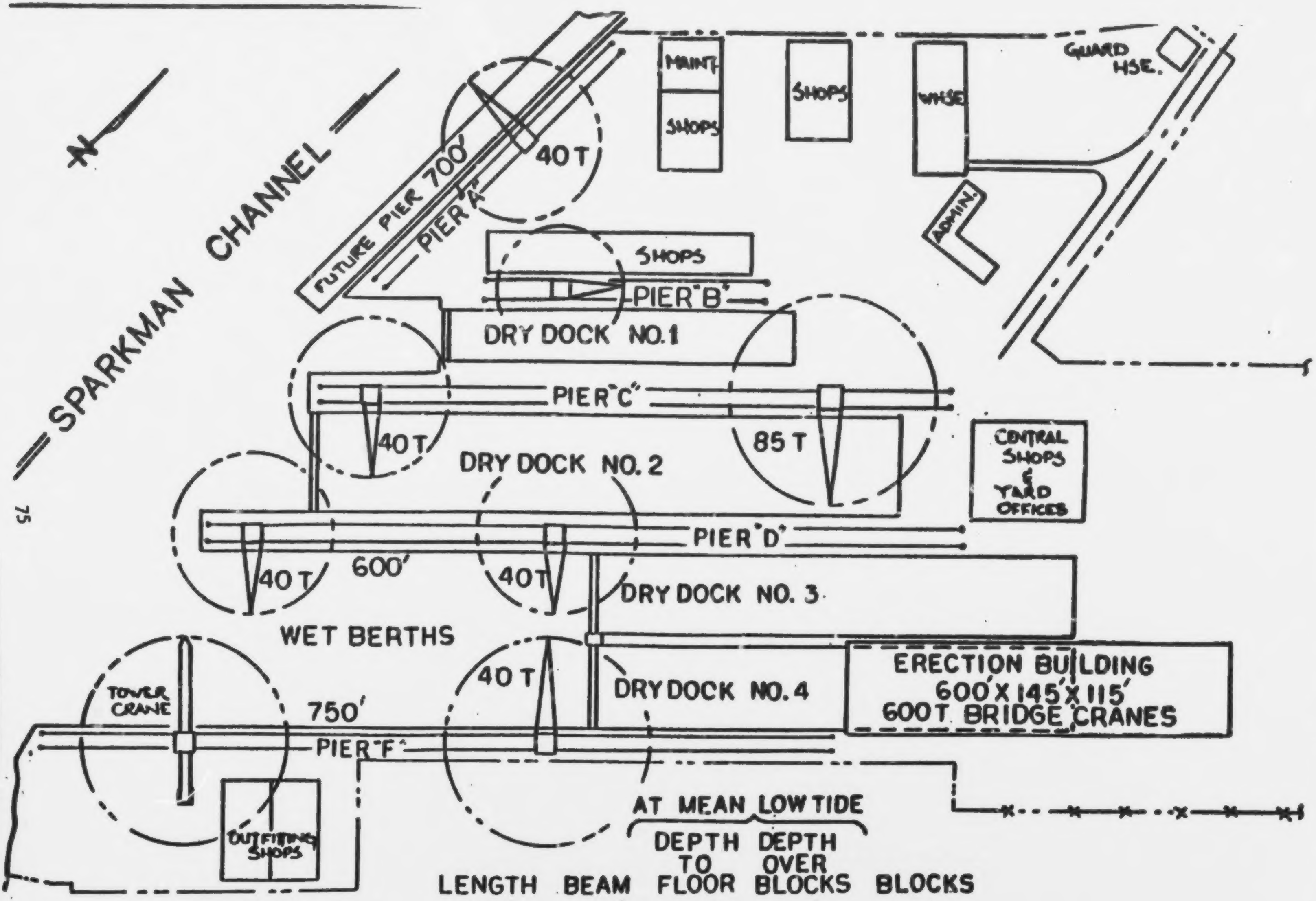


Exhibit 24

TACOMA BOATBUILDING COMPANY



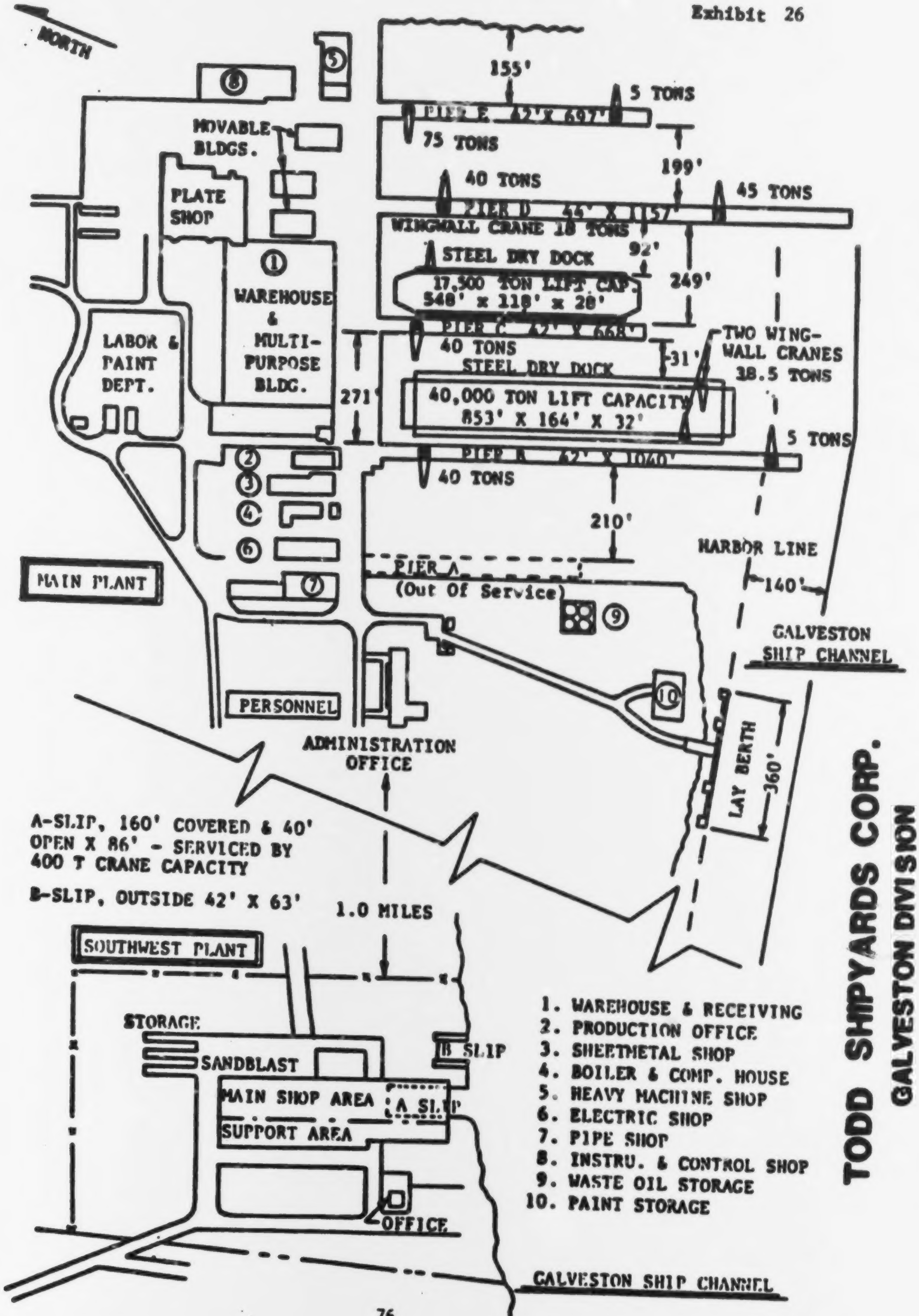
	LENGTH		BEAM	AT MEAN LOW TIDE DEPTH TO FLOOR	 DEPTH OVER BLOCKS	BLOCKS
DRYDOCK NO. 1	550'	X	76'	21'	17'	4'
NO. 2	900'	X	150'	26'	21'	5'
NO. 3	750'	X	125'	28'	23'	5'
NO. 4	750'	X	125'	28'	23'	5'

Hookers Point Yard

TAMPA SHIPYARDS INCORPORATED

Exhibit 25

Exhibit 26



A-SLIP, 160' COVERED & 40' OPEN X 86' - SERVICED BY 400 T CRANE CAPACITY

B-SLIP, OUTSIDE 42' X 63'

1. WAREHOUSE & RECEIVING
2. PRODUCTION OFFICE
3. SHEETMETAL SHOP
4. BOILER & COMP. HOUSE
5. HEAVY MACHINE SHOP
6. ELECTRIC SHOP
7. PIPE SHOP
8. INSTRU. & CONTROL SHOP
9. WASTE OIL STORAGE
10. PAINT STORAGE

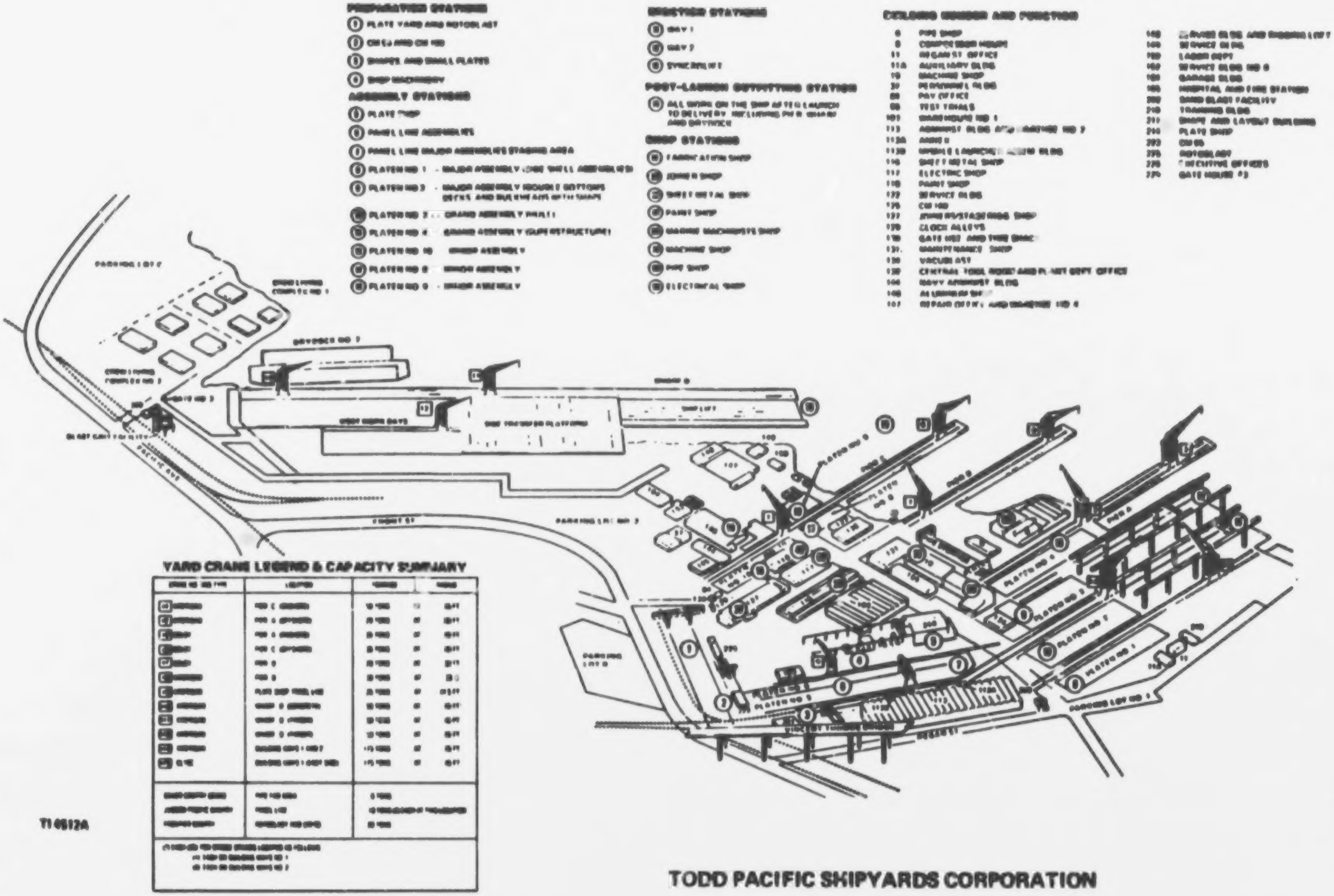
TODD SHIPYARDS CORP.

GALVESTON DIVISION

77

BEST COPY AVAILABLE

Exhibit 27



T10512A

TODD PACIFIC SHIPYARDS CORPORATION

LOS ANGELES DIVISION

77

TODD SHIPYARDS CORPORATION
SAN FRANSISCO DIVISION

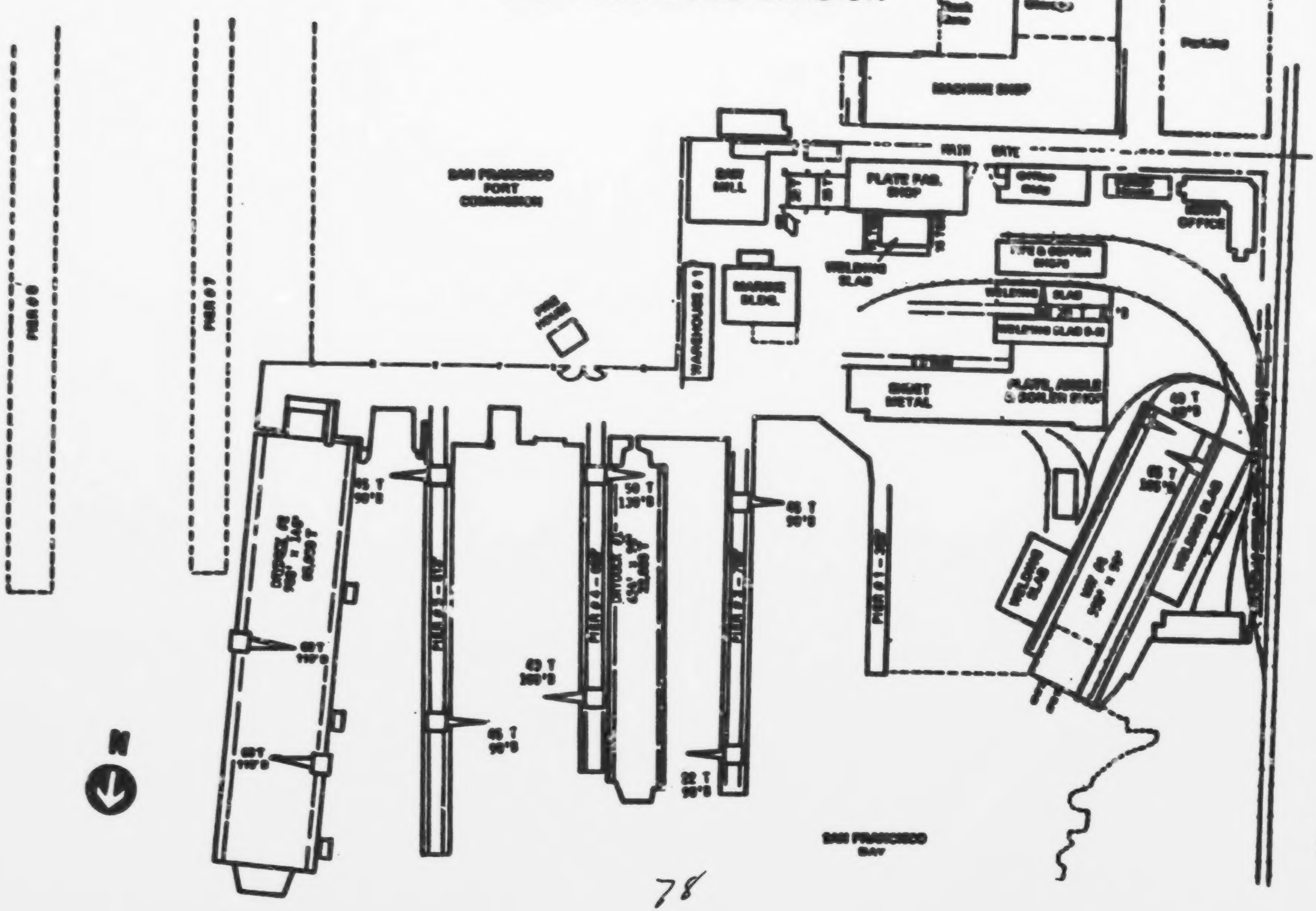
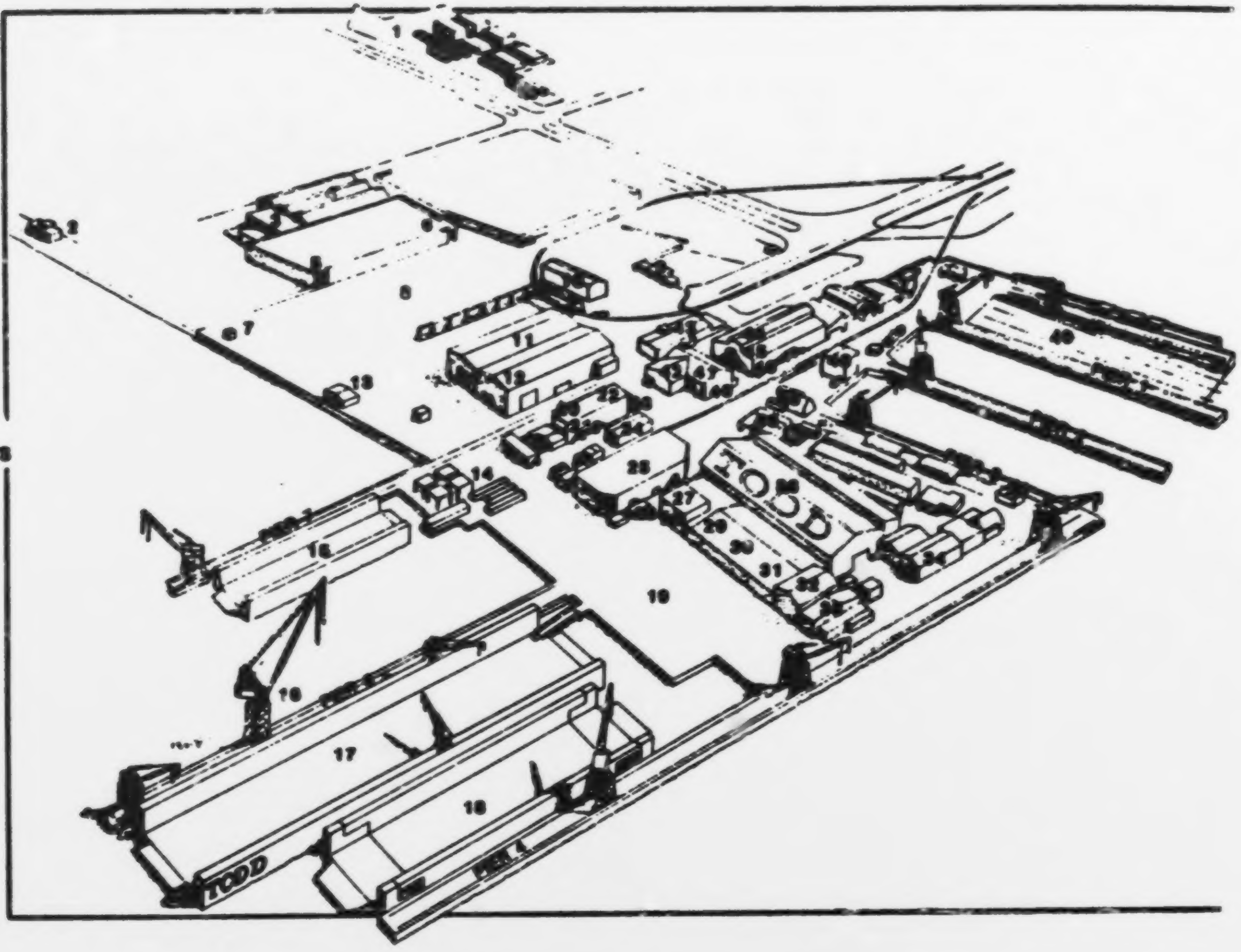


Exhibit 28

1. CREW'S BERTHING
2. MESSING FACILITY
3. SHIPPING/RECEIVING
4. WAREHOUSE
5. DATA PROCESSING
6. PURCHASING
7. SMALL BOAT COVERED WORK AREA
8. STEEL STORAGE AREA
9. MAIN GATE/SECURITY
10. SHOT BLAST FACILITY
11. ALUMINUM FABRICATION
12. AUTOMATED BURNING EQUIPMENT
13. ACID BATH CLEANING
14. SITE OF SHIP'S OFFICE AND DUTY BERTHING
15. DRYDOCK NO. 2
16. 150 TON WHIRLEY CRANE
17. DRYDOCK NO. 3 "EMERALD SEA"
18. DRYDOCK NO. 1
19. STAGING AREA
20. PRODUCTION PLANNING
21. CAFETERIA
22. NEW CONSTRUCTION SHIP SUPERINTENDENTS
23. COMBAT SYSTEMS DEPARTMENT
24. OUTSIDE MACHINE SHOP
25. INSIDE MACHINE SHOP
26. PORT ENGINEERS OFFICE
27. REPAIR SUPERINTENDENTS
28. YARD OFFICE
29. PIPE SHOP
30. CENTRAL TOOL ROOM
31. CARPENTER SHOP
32. ELECTRIC SHOP
33. RIGGING LOFT
34. SHEET METAL
35. QUALITY ASSURANCE
36. MAIN STEEL SHOP
37. MARINE CHEMIST/FIRE DEPT.
38. PUMP, MOTOR & VALVE SHOP/TEST FACILI
39. PAINT SHOP
40. DISPENSARY/CLAIMS DEPT.
41. ENGINEERING
42. NAVY PROGRAM OFFICE
43. ADMINISTRATION OFFICES
44. TECHNICAL LIBRARY DRAWING CONTROL
45. TEST & TRIAL OFFICE
46. GENERAL SUPERINTENDENTS
47. SOUTH STEEL SHOP
48. MISSILE LAUNCHER ASSEMBLY BUILDING
49. CONSTRUCTION WAYS

79

BEST COPY AVAILABLE



TODD
PACIFIC SHIPYARDS CORPORATION
SEATTLE DIVISION

Exhibit 29

79

80

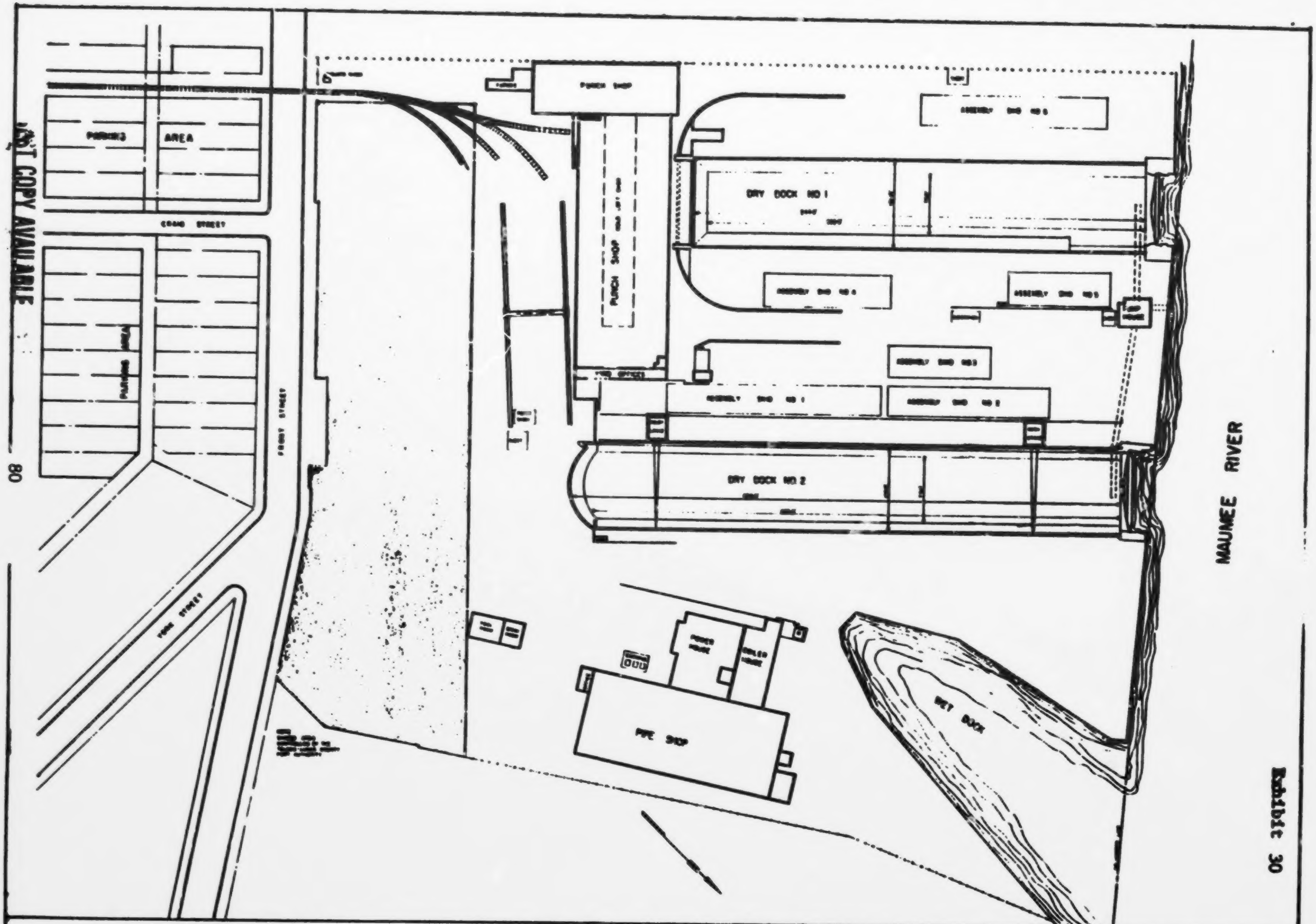


Exhibit 30

THE TOLEDO SHIPYARD

GENERAL ARRANGEMENT

DATE 10-13-66

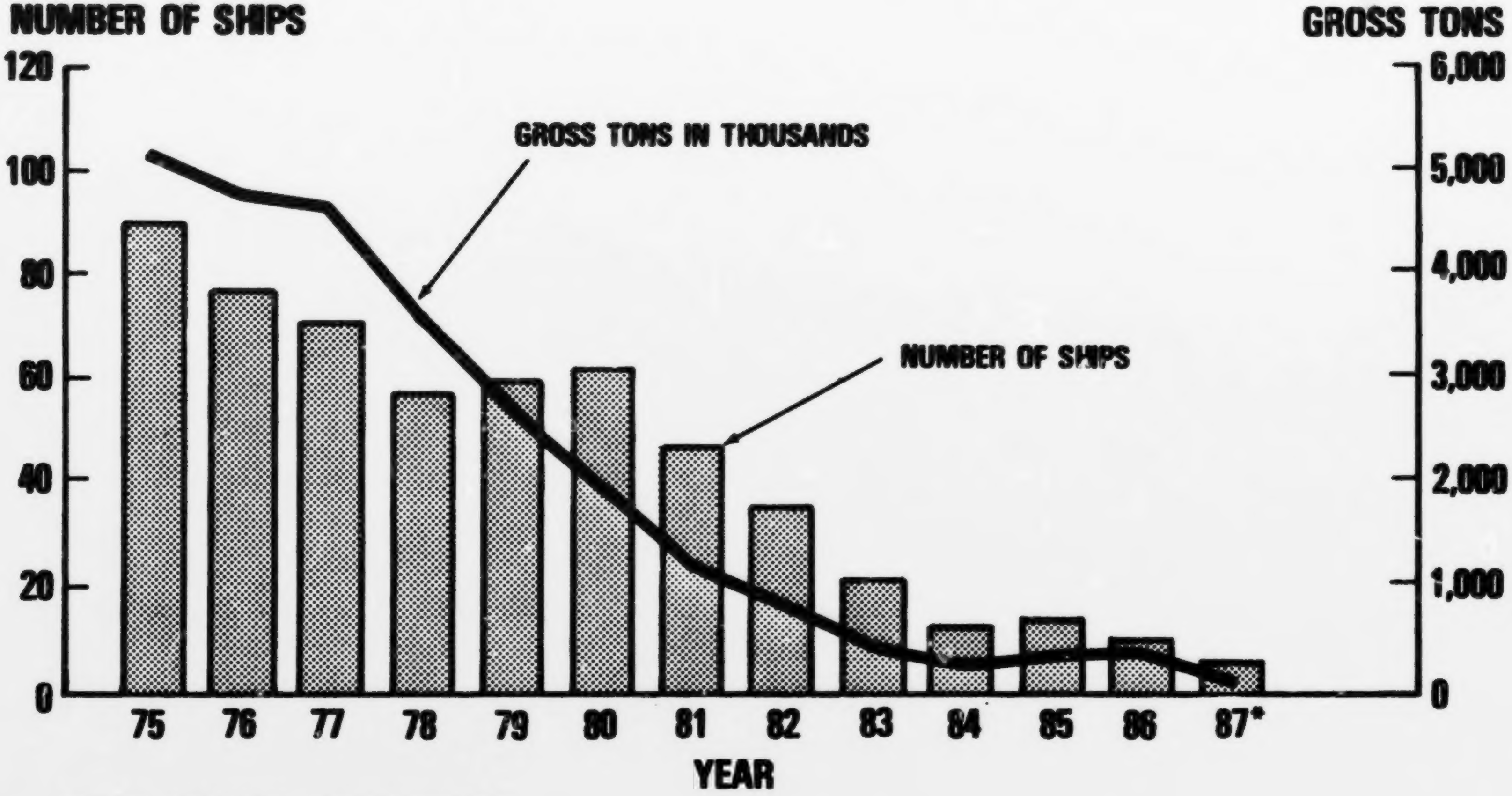
MERCE INDUSTRIES

TOLEDO, OHIO

80

MERCHANT VESSELS BUILDING OR ON ORDER (AS OF JANUARY 1)

SHIPS OF 1,000 GROSS TONS AND OVER



SOURCE: MARITIME ADMINISTRATION

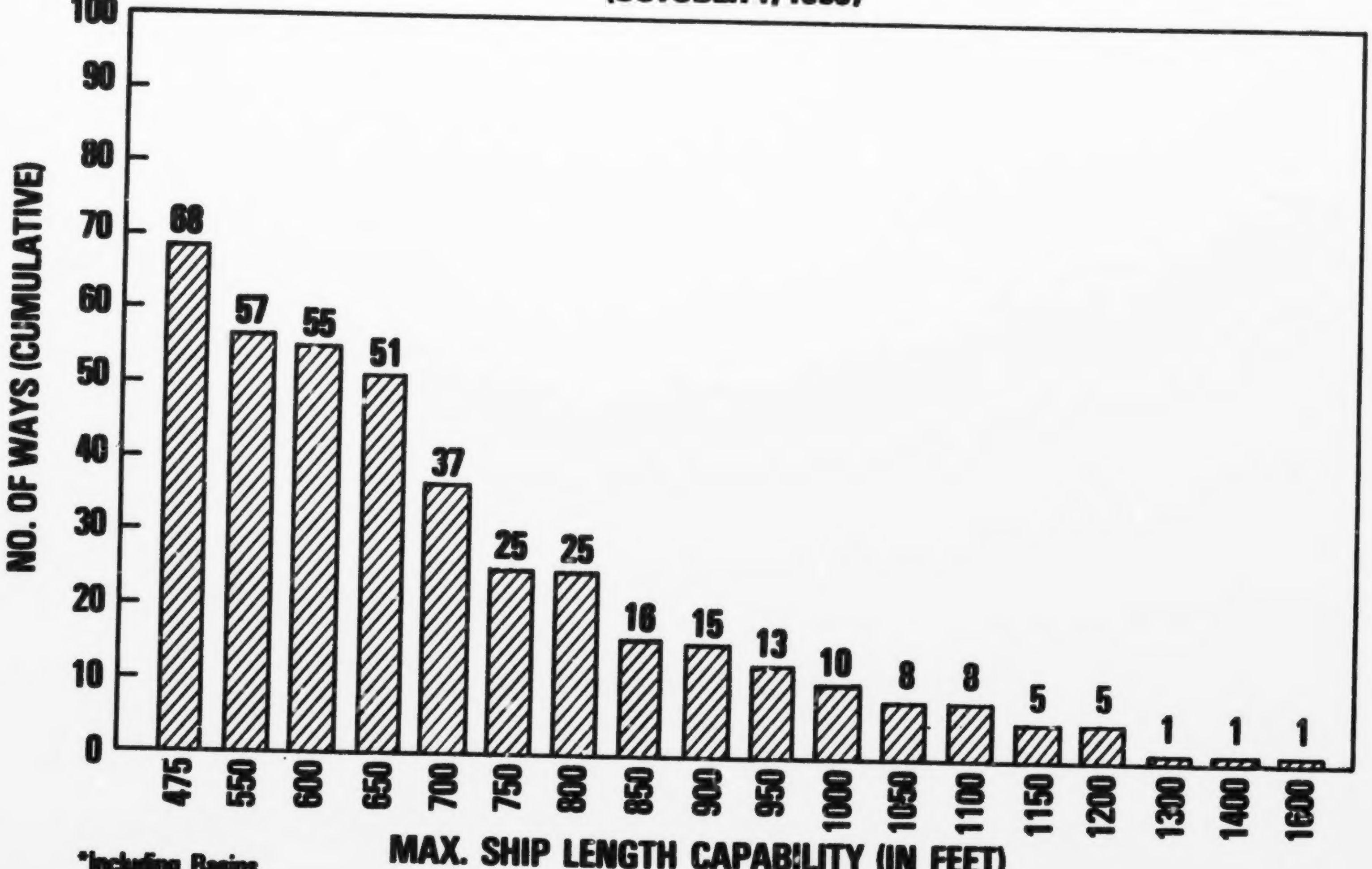
*FORECAST

Exhibit 31

MAJOR U.S. SHIPBUILDING FACILITIES

*NUMBER OF SHIPWAYS BY MAXIMUM LENGTH CAPABILITY

(OCTOBER 1, 1986)



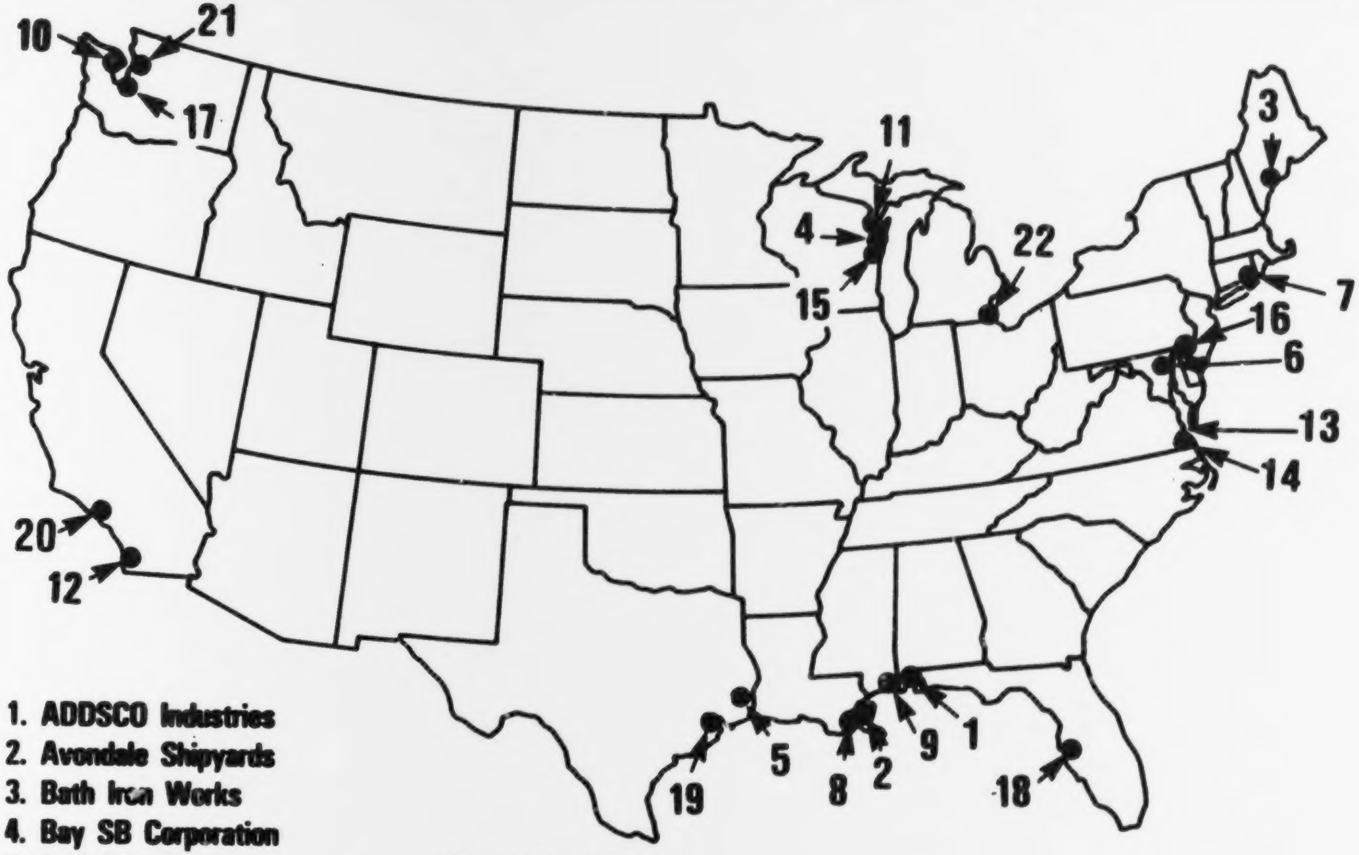
*Including Basins

Exhibit 32

BEST COPY AVAILABLE

Exhibit 33

ACTIVE U.S. SHIPBUILDING BASE



1. ADDSCO Industries
2. Avondale Shipyards
3. Bath Iron Works
4. Bay SB Corporation
5. Beth-Beaumont
6. Beth-Sparrows Point
7. Gen. Dyn.-Elec. Boat
8. Halter Marine-Equitable
9. Litton/Ingalls
10. Lockheed SB
11. Marinette
12. NASSCO
13. Newport News
14. Norfolk SB & DD
15. Peterson
16. Penn Ship
17. Tacoma Boat
18. Tampa Ship
19. Todd-Galveston
20. Todd-Los Angeles
21. Todd-Seattle
22. Toledo Shipyard

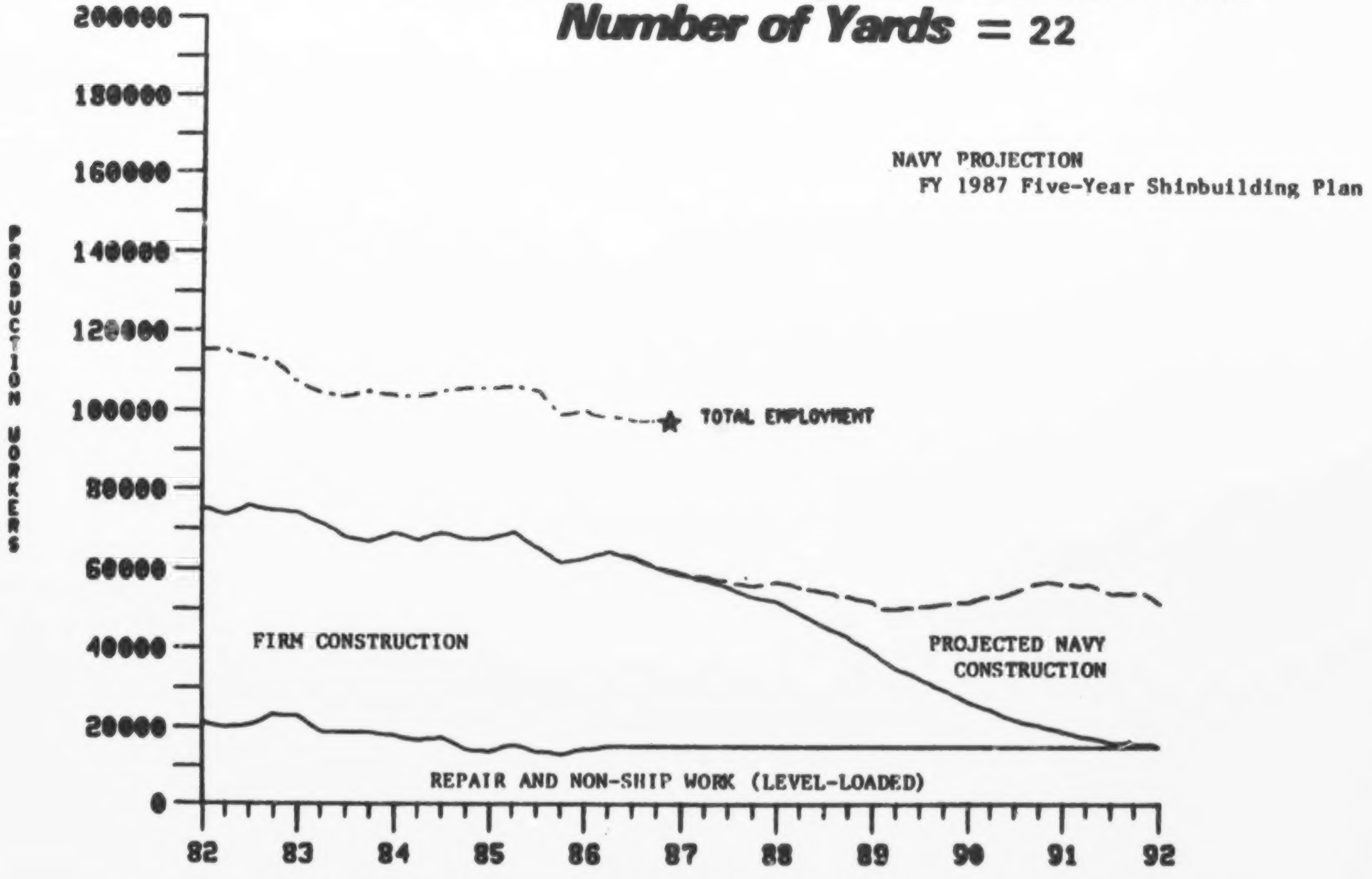
1986

83

Shipbuilding Industry Workload Projection

Active Shipbuilding Base Summation

Number of Yards = 22



October 1, 1986

SOURCE: SHIPYARD DATA FROM FORM MA832 WHEN PROVIDED
OFFICE OF SHIPBUILDING COSTS AND PRODUCTION, MARITIME ADMINISTRATION

84

Exhibit 34

TABLE 1

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

(MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES)

[1] **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		General Cargo						Dry Bulk		
SHIPYARD	BUILDING POSITION [1] (Number)	Gen. Cargo 475 X 68	Mob. Cargo 724 X 105	Container 610 X 90	RO/RO 684 X 102	LASH 893 X 100	Container 947 X 105	21,300 570 X 75	51,000 600 X 105	100,000 900 X 105
EAST COAST										
Bath Iron Works	650 X 88SW (2) 700 X 130SW	1 $\frac{2}{3}$	0 $\frac{0}{0}$	1 $\frac{2}{3}$	0 $\frac{2}{2}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	1 $\frac{2}{3}$	0 $\frac{2}{2}$	0 $\frac{0}{0}$
Bethlehem Steel, Sparrows Point	800 X 106SW 800 X 95SW 1200 X 192GD	1 1 $\frac{4}{6}$	1 0 $\frac{1}{2}$	1 1 $\frac{3}{5}$	1 0 $\frac{2}{3}$	0 0 $\frac{1}{1}$	0 0 $\frac{1}{1}$	1 1 $\frac{4}{6}$	1 0 $\frac{2}{3}$	0 0 $\frac{1}{1}$
Newport News	668 X 93SW 958 X 121GD 1100 X 136GD 1609 X 246GD	1 2 2 $\frac{9}{14}$	0 1 1 $\frac{4}{6}$	1 2 2 $\frac{5}{10}$	0 1 1 $\frac{4}{6}$	0 1 1 $\frac{2}{4}$	0 1 1 $\frac{2}{4}$	1 2 2 $\frac{6}{11}$	0 1 2 $\frac{4}{7}$	0 1 1 $\frac{1}{3}$
Norfolk SB & DD	475 X 85SW	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
Penn Ship	(2) 745 X 129SW 720 X 195LL 1100 X 195LL	2 1 $\frac{2}{5}$	2 1 $\frac{1}{4}$	2 1 $\frac{1}{4}$	2 1 $\frac{1}{6}$	0 0 $\frac{1}{1}$	0 0 $\frac{1}{1}$	2 1 $\frac{1}{4}$	2 1 $\frac{1}{4}$	0 0 $\frac{1}{1}$

1/ LEGEND
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Synorolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		General Cargo						Dry Bulk		
SHIPYARD	BUILDING POSITION 1/ (Number)	Gen. Cargo 475 X 68	Mob. Cargo 724 X 105	Container 610 X 90	RO/RO 684 X 102	LASH 893 X 100	Container 947 X 105	21,300 570 X 75	51,000 600 X 105	100,000 900 X 105
Robert Derecktor	500 X 90LL	1 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
GULF COAST										
ADDSCO	(4) 523 X 90SW 620 X 105SW	4 1 5	0 0 0	0 1 1	0 0 0	0 0 0	0 0 0	0 1 1	0 0 0	0 0 0
Avondale	(2)1020 X 175LL (3)1200 X 126LL	8 6 14	2 4 6	3 5 8	3 4 7	2 4 6	2 3 5	5 6 12	3 5 8	2 3 5
Bethlehem, Beaumont	960 X 105SW	1 1	1 1	1 1	1 1	1 1	0 0	1 1	1 1	1 1
Littons/Ingalls E. & W. Banks	690 X 85SW 550 X 80SW (4) 650 X 90SW (5) 844 X 260LL * 1540 X 180LL *	1 1 4 25 3 34	0 0 0 11 2 13	0 0 4 13 2 19	0 0 0 11 2 13	0 0 0 0 0 0	0 0 0 0 0 0	1 0 4 16 2 23	0 0 0 11 2 13	0 0 0 0 0 0

* Ship size constrained by maximum launching capability of 850' X 173'.

1/ **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		General Cargo						Dry Bulk		
SHIPYARD	BUILDING POSITION 1 (Number)	Gen. Cargo 475 X 68	Mob. Cargo 724 X 105	Container 610 X 90	RO/RO 684 X 102	LASH 893 X 100	Container 947 X 105	21,300 570 X 75	51,000 600 X 105	100,000 900 X 105
Marathon, Brownsville	1100 X 150SW	4 — 4	1 — 1	1 — 1	1 — 1	1 — 1	1 — 1	1 — 1	1 — 1	1 — 1
Tampa Shipyards	(2) 746 X 121GD	2 — 2	2 — 2	2 — 2	2 — 2	0 — 0	0 — 0	2 — 2	2 — 2	0 — 0
Todd-Galveston	475 X 85SW	1 — 1	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0
WEST COAST										
Lockheed	(2) 650 X 90SW 690 X 90SW	2 1 — 3	0 0 — 0	2 1 — 3	0 0 — 0	0 0 — 0	0 0 — 0	2 1 — 3	0 0 — 0	0 0 — 0
Marine Power & Equipment	(2) 500 X 104SW	2 — 2	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0
National Steel & Shipbuilding Co.	690 X 90SW (2) 900 X 106SW 980 X 170GD	1 2 4 — 7	0 2 1 — 3	1 2 1 — 4	0 2 1 — 3	0 2 1 — 3	0 0 1 — 1	1 2 2 — 5	0 2 1 — 3	0 2 1 — 3

1/ **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		General Cargo						Dry Bulk		
SHIPYARD	BUILDING POSITION [1] (Number)	Gen. Cargo 475 X 68	Mob. Cargo 724 X 105	Container 610 X 90	RO/RO 684 X 102	LASH 893 X 100	Container 947 X 105	21,300 570 X 75	51,000 600 X 105	100,000 900 X 105
Portland SRY	475 X 100LL 810 X 100LL	1 $\frac{1}{2}$	0 $\frac{1}{1}$	0 $\frac{1}{1}$	0 $\frac{1}{1}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{1}{1}$	0 $\frac{1}{1}$	0 $\frac{0}{0}$
Tacoma Boat	650 X 400SW	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{0}{0}$
Todd-LA	(2) 725 X 87SW 826 X 147LL * 545 X 116LL *	2 $\frac{3}{5}$	0 $\frac{1}{1}$	0 $\frac{2}{2}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	2 $\frac{2}{4}$	0 $\frac{2}{2}$	0 $\frac{0}{0}$
Todd-San Francisco	550 X 90SW	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
Todd-Seattle	600 X 96SW	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$

* Ship size constrained by 655' X 106' syncrolift capacity.

85

[1] **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		General Cargo						Dry Bulk		
SHIPYARD	BUILDING POSITION [1] (Number)	Gen. Cargo 475 X 68	Mob. Cargo 724 X 105	Container 610 X 90	RO/RO 684 X 102	LASH 893 X 100	Container 947 X 105	21,300 570 X 75	51,000 600 X 105	100,000 900 X 105
GREAT LAKES *										
Bay SB Corp.	1100 X 136GD 730 X 105SW	2 $\frac{1}{3}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	1 $\frac{1}{2}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$
Fraser Shipyards	825 X 82GD	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$
The Toledo Shipyard	540 X 68GD 660 X 78GD	0 $\frac{1}{1}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$

* (NOTE: Maximum size ship that can exit the St. Lawrence Seaway is 730' X 78'.)

1/ LEGEND
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		Tankers							OBO	
SHIPYARD	BUILDING POSITION [1] (Number)	25,000 620 X 75	38,000 688 X 90	89,000 894 X 105	120,000 920 X 138	125,000 Cu.m. 932 X 140	225,000 1100 X 140	265,000 1100 X 178	80,000 886 X 105	160,000 998 X 143
EAST COAST										
Bath Iron Works	650 X 88SW (2) 700 X 130SW	1 2 — 3	0 2 — 2	0 0 — 0	0 0 — 0	0 0 — 0	0 0 — 0	0 0 — 0	0 0 — 0	0 0 — 0
Bethlehem Steel, Sparrows Point	800 X 106SW 800 X 95SW 1200 X 192GD	1 1 3 — 5	1 1 2 — 4	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1
Newport News	668 X 93SW 958 X 121GD 1100 X 136GD 160y X 246GD	1 1 1 6 — 9	1 1 1 4 — 7	0 1 1 2 — 4	0 0 1 1 — 2	0 0 1 1 — 2	0 0 1 1 — 2	0 0 0 1 — 1	0 1 1 2 — 3	0 0 0 1 — 1
Norfolk SB & DD	475 X 85SW	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0	0 — 0
Penn Ship	(2) 745 X 129SW 720 X 195LL 1100 X 195LL	2 1 1 — 4	2 1 1 — 4	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1	0 0 1 — 1

1/ **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Synorolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		Tankers							OBO	
SHIPYARD	BUILDING POSITION 1/ (Number)	25,000 620 X 75	38,000 588 X 90	89,000 894 X 105	120,000 920 X 138	125,000 Cu.m. 932 X 140	225,000 1100 X 140	265,000 1100 X 178	80,000 886 X 105	160,000 998 X 143
Robert Derecktor	500 X 90LL	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
GULF COAST										
ADDSCO	(4) 523 X 90SW 620 X 105SW	0 1 1	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
Avondale	(2)1020 X 175LL (3)1200 X 126LL	3 5 8	3 4 7	2 4 6	2 0 2	2 0 2	1 0 1	1 0 1	2 4 6	1 3 4
Bethlehem, Beaumont	960 X 105SW	1 1	1 1	1 1	0 0	0 0	0 0	0 0	1 1	0 0
Litton/Ingalls E. & W. Banks	690 X 85SW 550 X 80SW (4) 650 X 90SW (5) 844 X 260LL * 1540 X 180LL *	1 0 4 16 2 23	0 0 0 13 2 15	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0

* Ship size constrained by maximum launching capability of 850' X 173' vessels.

92

1/ **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		Tankers							OBO	
SHIPYARD	BUILDING POSITION 1/ (Number)	25,000 620 X 75	38,000 688 X 90	89,000 894 X 105	120,000 920 X 138	125,000 Cu.m. 932 X 140	225,000 1100 X 140	265,000 1100 X 178	80,000 886 X 105	160,000 998 X 143
Marathon, Brownsville	1100 X 150SW	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{1}{1}$	$\frac{1}{1}$
Tampa Shipyards	(2) 746 X 121GD	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
Todd-Galveston	475 X 85SW	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
WEST COAST										
Lockheed	(2) 650 X 90SW 690 X 90SW	2 $\frac{1}{3}$	0 $\frac{1}{1}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$
Marine Power & Equipment	(2) 500 X 104SW	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
National Steel & Shipbuilding Co.	690 X 90SW (2) 900 X 106SW 980 X 170GD	1 2 $\frac{2}{5}$	1 2 $\frac{1}{4}$	0 2 $\frac{1}{3}$	0 0 $\frac{1}{1}$	0 0 $\frac{1}{1}$	0 0 $\frac{0}{0}$	0 0 $\frac{0}{0}$	0 0 $\frac{1}{1}$	0 0 $\frac{0}{0}$

1/ **LEGEND**
Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

SHIPYARD	BUILDING POSITION 1/ (Number)	Tankers 25,000 620 X 75	Tankers 38,000 688 X 90	Tankers 89,000 894 X 105	Tankers 120,000 920 X 138	Tankers 125,000 Cu.m. 932 X 140	Tankers 225,000 1100 X 140	Tankers 265,000 1100 X 178	OBO 80,000 886 X 105	OBO 160,000 998 X 145
Portland SRY	475 X 100LL 810 X 108LL	0 $\frac{1}{1}$	0 $\frac{1}{1}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$
Tacoma Boat	650 X 400SW	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
Todd-LA	(2) 725 X 87SW 826 X 147LL * 545 X 116LL *	2 $\frac{2}{4}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$
Todd-San Francisco	550 X 90SW	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
Todd-Seattle	600 X 96SW	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$

* Ship size constrained by 655' X 106' syncrolift capacity.

1/ **LEGEND**

Maximum Ship Size

SW=Shipway
GD=Graving Drydock
LL=Land Level Position
SL=Syncrolift

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

		Tankers							OBO	
SHIPYARD	BUILDING POSITION 1/ (Number)	25,000 620 X 75	38,000 688 X 90	89,000 894 X 105	120,000 920 X 138	125,000 Cu.m. 932 X 140	225,000 1100 X 140	265,000 1100 X 178	80,000 886 X 105	160,000 998 X 143
GREAT LAKES *										
Bay SB Corp.	1100 X 136GD 730 X 105SW	1 $\frac{1}{2}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$
Fraser Shipyards	825 X 82GD	$\frac{1}{1}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$
The Toledo Shipyard	540 X 68GD 680 X 78GD	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$	0 $\frac{0}{0}$

* (NOTE: Maximum size ship that can exit the St. Lawrence Seaway is 730' X 78'.)

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE
MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

SUMMARY

	General Cargo						Dry Bulk		
REGION	Gen. Cargo 475 X 68	Mob. Cargo 724 X 105	Container 610 X 90	RO/RO 684 X 102	LASH 893 X 100	Container 947 X 105	21,300 570 X 75	51,000 600 X 105	100,000 900 X 105
EAST COAST	30	12	22	17	6	6	24	16	5
GULF COAST	61	23	32	24	8	6	40	25	7
WEST COAST	22	5	11	4	3	1	15	7	3
GREAT LAKES *	5	0	0	0	0	0	3	0	0
TOTAL POSITIONS - ALL YARDS	118	40	65	45	17	13	82	50	15

	Tankers							OBO	
REGION	25,000 620 X 75	38,000 688 X 90	89,000 894 X 105	120,000 920 X 138	125,000 Cu.m. 932 X 140	225,000 1100 X 140	265,000 1100 X 178	80,000 886 X 105	160,000 998 X 143
EAST COAST	21	17	6	4	4	4	3	6	3
GULF COAST	36	26	8	3	3	2	1	8	5
WEST COAST	14	6	3	1	1	0	0	1	0
GREAT LAKES *	3	0	0	0	0	0	0	0	0
TOTAL POSITIONS - ALL YARDS	74	49	17	8	8	6	4	15	8

* (NOTE: Maximum size ship that can exit the St. Lawrence Seaway is 730' X 78'.)

TABLE 2

NUMBER OF SHIPBUILDING WAYS BY LENGTH

(MAXIMUM SHIP SIZE)

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

NUMBER OF BUILDING WAYS BY LENGTH (MAXIMUM SHIP SIZE) *

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

Length OA (In Feet):	475	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1300	1400	1600
EAST COAST																		
Bath Iron Works	3	3	3	3	2													
Beth-Sparrows Point	3	3	3	3	3	3	3	1	1	1	1	1	1	1	1			
General Dynamics, E. Boat **																		
Newport News SB & DD	5	5	5	4	3	3	3	3	3	3	2	2	2	1	1	1	1	1
Norfolk SB & DD	1																	
Penn Ship (formerly Sun)	4	4	4	4	4	1	1	1	1	1	1	1	1					
Robert Derecktor	1																	
TOTAL	(17)	(15)	(15)	(14)	(12)	(7)	(7)	(5)	(5)	(5)	(4)	(4)	(4)	(2)	(2)	(1)	(1)	(1)
GULF COAST																		
ADDSCO Industries	5	1	1															
Avondale Shipyards	5	5	5	5	5	5	5	5	5	5	5	3	3	3	3			
Beth-Beaumont	1	1	1	1	1	1	1	1	1	1								
Ingalls-E. & W. Banks	12	12	11	11	6	6	6	1										
Marathon LeTourneau	1	1	1	1	1	1	1	1	1	1	1	1	1					
Tampa Shipyards	2	2	2	2	2													
Todd-Galveston	1																	
TOTAL	(27)	(22)	(21)	(20)	(15)	(13)	(13)	(8)	(7)	(7)	(6)	(4)	(4)	(3)	(3)			

---

* Including Basins.

** Engaged exlusively in U.S. Navy submarine construction.

NUMBER OF BUILDING WAYS BY LENGTH (MAXIMUM SHIP SIZE) *

MAJOR U.S. PRIVATE SHIPBUILDING FACILITIES

Length OA (In Feet):	475	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1300	1400	1600
WEST COAST																		
Lockheed Shipbuilding	3	3	3	3														
Marine Power & Equip.	2																	
National Steel & SB	4	4	4	4	3	3	3	3	3	1								
Portland Ship Repair	1	1	1	1	1	1	1											
Tacoma Boat	1	1	1	1														
Todd-Los Angeles	5	4	4	4	3	1	1											
Todd-SF (formerly Beth)	1	1																
Todd-Seattle	1	1	1															
TOTAL	(18)	(15)	(14)	(13)	(7)	(5)	(5)	(3)	(3)	(1)								
GREAT LAKES **																		
Bay SB Corporation	2	2	2	2	2													
Fraser Shipyards	2	2	2	1	1													
Toledo Shipyard	2	1	1	1														
TOTAL	(6)	(5)	(5)	(4)	(3)													
GRAND TOTAL ALL COASTS AND GREAT LAKES	(68)	(57)	(55)	(51)	(37)	(25)	(25)	(16)	(15)	(13)	(10)	(8)	(8)	(5)	(5)	(1)	(1)	(1)

* Including Basins.

** Maximum size ship that can exit St. Lawrence Seaway locks is 730' X 78'.

APPENDIX A

STANDARD FORM 17

FACILITIES AVAILABLE FOR THE CONSTRUCTION OR REPAIR OF SHIPS

STANDARD FORM 17
October 1966
DEPARTMENT OF THE NAVY (BUSHIPS)
& MARITIME ADMINISTRATION
Coordinator for Ship Repair
and Conversion (DOD-DOC)

FACILITIES AVAILABLE FOR THE CONSTRUCTION OR REPAIR OF SHIPS

Form Approved
OMB No. 45-R0286

DATE

TO: (Complete departmental address)

SHIPYARD AND ADDRESS

INSTRUCTIONS
(Forward original copy to appropriate Department of Defense Office or Maritime Administration, Washington, D.C.)

BUILDING WAYS (M.L.W.)

NO. OF WAY	LAUNCHING (Check one)	DIMENSIONS	MAXIMUM SHIP SIZE (Ton 2,240 lbs.)	DEPTH OF WATER		CONDITION OF WAY	CRANES SERVING WAY		
				Over way end	At drop off		No.	Type (Plus hook height for bridge cranes)	Lift Capacity (Std. tons)
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						
	☐ End ☐ Side ☐ Basin	Length Width Depth	Length O.A. Beam Weight						

LENGTH OF LAUNCHING RUN

DEPTH OF RUN AT M.L.W.

TIDAL RANGE (Difference M.L.–M.H.)

IS FIRE PROTECTION AVAILABLE ON BUILDING WAY? ☐ YES ☐ NO

IS SNUBBING NECESSARY? ☐ YES ☐ NO

SHIPS' BERTHS (PIERS, WHARVES, BULKHEADS, MOORING DOLPHINS) (M.L.W.)

NO.	TYPE	LENGTH (Actual and usable)	WATER DEPTH		HEIGHT OF DOCK	USE REPAIR AND/OR OUTFITTING	SERVICE AVAILABLE (Use abbreviations of services and units of measure noted under legend)	CRANES SERVING BERTHS, ETC.		
			Inboard	Outboard				No.	Type (Hook height above M.L.W.)	L/R Capacity (Standard tons)
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....
		Act. .... Use.								L/R .... Reach ....

DRYDOCKS (mean HIGH water) (List building docks under building ways)

DOCK NO.	MATERIAL CONSTD. OF—TYPE	MAXIMUM SHIP SIZE ACCOMMODATED LENGTH OA–BEAM	LENGTH			CLEAR WIDTH		DEPTH/DRAFT			LIFTING CAPACITY (Ton 2,240 lbs.)
	Floating—(FD); Graving—(GD); Marine Railway—(MR)		Overall	At coping (GD); on pontoons (FD)	At keel blocks; on cradle (MR)	At top; cradle (MR)	At keel blocks	Over sill (GD)	Over floor	Over keel blocks	

LEGEND: (Abbreviations of Services)

Fresh water..................	F.W.–G.P.M.–P.S.I.	Steam..................................	S-P/HR–P.S.I.	Electric power..................	E–V–AC–AMP	Fire protection..............	FP–G.P.M.–P.S.I.
Salt water..................	S.W.–G.P.M.–P.S.I.	Air..................................	A–C.F.M.–P.S.I.	Electric power..................	E–V–DC–AMP	Sanitary sewer..............	SS–Yes or No.

Sheet 2 of 6

102

PRINCIPAL SHOPS AND BUILDINGS						
NAME OF SHOP OR BUILDING	DIMENSIONS OF SHOP OR BUILDING	MATERIALS PROCESSED (See note)	LARGEST EXIT		WEIGHT OF MATERIAL OR NUMBER AND SIZE OF UNITS PRODUCED PER 8 HOURS (See note)	ALL OTHER SHOPS (List names and dimensions, include mold loft, if any)
			Width	Height		
Fabricating						
Plate			x x x x	x x x x		
Sheet metal						
Subassembly						
Carpenter			x x x x	x x x x	x x x x x x x	
Woodworking			x x x x	x x x x	x x x x x x x	
Boat assembly or molding						
Machine		x x x x x x	x x x x	x x x x	x x x x x x x	
Electrical		x x x x x x	x x x x	x x x x	x x x x x x x	
Electronic		x x x x x x	x x x x	x x x x	x x x x x x x	
Pipe						
Galvanizing						NOTE.—Indicate materials as steel, aluminum, reinforced plastic, wood, plywood, sheet metal, etc.
Foundry						
Rigger		x x x x x x	x x x x	x x x x		

SHOP OR YARD CRANES (5 tons or over)											
BRIDGE TYPE				STATIONARY, RAIL OR MOBILE							
Cap. (Std. tons)	Max. span	Height of hook	Area/shop serviced	Type	Cap. (Std. tons)	Max. reach	Capacity at reach	Boom length	Height hinge	Area serviced	Hgt. of hook above base at out reach

Sheet 3 of 6

BEST COPY AVAILABLE

MAJOR ITEMS OF MACHINE TOOLS AND EQUIPMENT (List briefly such of the large items as will indicate the capacities of all important shops in maximum work piece size, e.g., 30' plate bending rolls, 10' plate shears, 400 ton Hyd. press, 30' plate furnace, engine lathe 36" x 20" b.c., etc.)

STORAGE SPACE (Sq. ft.) FOR COMPONENTS AND MATERIALS (Less bay storage) (List dimensions for each area, plus type material stored)

RAW STEEL STORAGE (Sq. ft.)	WELDING AND ASSEMBLY (Sq. ft.)

ACREAGE LEGALLY CONTROLLED

IN USE	DEVELOPED (including in use)	TOTAL (including undeveloped)

EXISTING LOCAL ORDINANCES LIMITING PRODUCTIVE USE

LIMITATIONS IMPOSED BY PROPERTY ZONING CLASSIFICATION

YARD LAYOUT—PLEASE FURNISH A PLOT PLAN OF YARD OR PLANT, IF AVAILABLE

LOCATION OF PRODUCTION FACILITIES FOR PRODUCTS LISTED IN ITEM 11, OF STD. FORM 129

ON WATERFRONT
☐ Yes ☐ No

EMPLOYMENT	CURRENT	CURRENT NO. SHIFTS	MOBILIZATION—SHIFTS	
Management, administration				
Professional, engineering				
Professional, technical (All others)				
Production, skilled				
Production, semiskilled				
Production, unskilled				
Nonproduction				
Total		X X X X X X		X X X X

NUMBER OF PRODUCTION PERSONNEL PRESENTLY ENGAGED IN SHIP AND/OR BOAT CONSTRUCTION

IN SHIP OR BOAT REPAIR

APPROXIMATE TOTAL EMPLOYMENT OF ALL AFFILIATED CONCERNS ONLY LISTED IN ITEM 8, OF STD. FORM 129 (NOTE.—An affiliate is a concern that directly, or indirectly through one or more intermediaries controls, or is controlled by, or is under common control with, the reporting firm. Common ownership of stock by individuals does not in itself, constitute affiliation.)

DISTANCE TO NEAREST RAILROAD CONNECTION

DISTANCE TO NEAREST AIRPORT—IDENTIFY

LARGEST CONVEYANCE AVAILABLE AND MAXIMUM DIMENSIONS OF LOAD, FOR OVERLAND TRANSPORTATION OF FINISHED PRODUCTS (Not to exceed limitations imposed by local ordinances)

NAVIGATIONAL RESTRICTIONS (INDICATE ALL AT M.L.W.)

MINIMUM CHANNEL TO TIDEWATER

MINIMUM HORIZONTAL AND VERTICAL BRIDGE CLEARANCES TO TIDEWATER (Identify structures)

LIMITING LOCK DIMENSIONS TO TIDEWATER (Identify locks)

PROJECTS UNDER CONSTRUCTION WHICH WILL ALTER NAVIGATIONAL RESTRICTIONS (Specify projects and state effect and estimated completion)

DESCRIPTION OF TYPES OF WORK NORMALLY SUBCONTRACTED

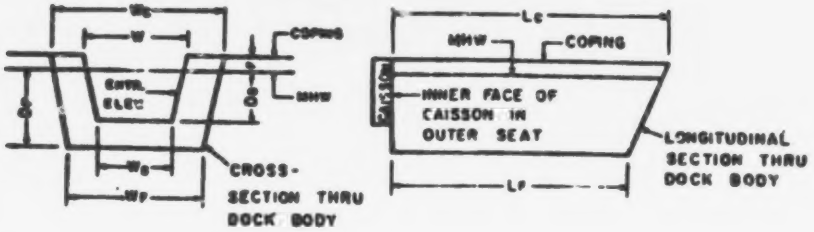
PRODUCTION EXPERIENCE (List at least three of the largest and the most complex ships or boats constructed, indicating (1) date completed, (2) hull length, beam, and molded depth, (3) type propulsion unit (fully described), (4) horsepower, (5) electrical and/or electronic installation, (6) special piping features, (7) size and tensile strength of plates, if steel, or type hull material, if other than steel, (8) special annealing, heat treating, or stress relieving problems encountered, if steel, plus, (9) any other important problems resolved). (NOTE.—If no previous construction experience give detailed description of major conversion or industrial manufacturing work considered comparable to ship or boat construction.)

☆U.S. Government Printing Office: 1979—281-047/4025

106

GRAVING DRYDOCK CHARACTERISTICS SUMMARY

GRAVING DRYDOCK NOMENCLATURE


WC
W
COPING
ENTR. ELEV.
DF
DS
MHW
WS
WF
CROSS-SECTION THRU DOCK BODY
LC
MHW
COPING
CAISSON
INNER FACE OF CAISSON IN OUTER SEAT
LONGITUDINAL SECTION THRU DOCK BODY
LF

KEY

MHW - Mean High Water
DF - Depth of Dock from MHW to Floor
DS - Depth of Dock from MHW to sill
LC - Length of Dock at coping
LF - Length of Dock at Floor
W - Width of Dock at top of entrance
WC - Width of Dock at coping or maximum clear width above Dock Floor
WF - Width at Dock Floor
WS - Width of Dock at entrance (sill)
F - Freeboard. Distance from MHW to top of coping. Indicate if part of F may be superflooded.

DRY DOCK NUMBER	LENGTH		ENTRANCE DIMENSIONS			DOCK BODY DIMENSIONS				SUPERFLOODING	STANDARD DEFINITION	A.C. AMPERES (60 HZ-30)			REMARKS
			WIDTH		DEPTH	WIDTH		DEPTH	FREEBOARD			480V Max. Hotel (Indus)	2400V Alt. Hotel	13.2KV Test/Check	(e.g. indicate dimensions of pits in dock floor)
	FLOOR	COPING	SILL	COPING	MHW	FLOOR	COPING	MHW			$L_C x W_C x D_S / D_F$				
	L_F	L_C	W_S	W	D_S	W_F	W_C	D_F	F						
107															

FLOATING DRYDOCK CHARACTERISTICS SUMMARY

FLOATING DRYDOCK	MAXIMUM LENGTH OF PONTOON	MAXIMUM DEPTH OVER BLOCKS	CLEAR WIDTH BETWEEN WINGWALLS	LIFT CAPACITY (TONS)	NORMAL KEEL BLOCK HEIGHT	A.C. AMPHERES (60HZ-30)			REMARKS (Indicate existence of hauling blocks, if end selection can be lowered, and max. length of ship DD can accomodate).
						480V MAX. HOTEL (Indus.)	2400V ALT. HOTEL	13.2KV TEST/ CHECK	

APPENDIX B

MAJOR U.S. SHIPBUILDING, REPAIR (WITH DRYDOCKING), AND TOPSIDE REPAIR FACILITIES

CLASSIFICATION DEFINITIONS

- Shipbuilding: Facilities that are open, having at least one shipbuilding position, either an inclined way, a side-launching platform, or a building basin--provided that water depth in the channel to the facility itself is at least 12 feet--capable of accommodating a minimum ship size of 475' X 68'. With few exceptions, these shipbuilding facilities are also major repair facilities with drydocking capability.

- Repair (With Drydocking): Drydocking facilties for ships 400' in length and over, provided that water depth in the channel to the facility itself is at least 12 feet. These facilities may also be capable of constructing a vessel smaller than 475' X 68' and/or have drydocks for vessels smaller than 400' in length.

- Topside Repair: Facilities with sufficient berth/pier space for topside repair of ships 400' in length and over, provided that water depth in the channel to the facility itself is at least 12 feet. These facilities may also be capable of constructing a vessel smaller than 475' X 68' and/or have drydocks for vessels smaller than 400' in length.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Shipbuilding Yards			
Bath Iron Works 700 Washington Street Bath, ME 04530	650 X 88 SW (2) 700 X 130 SW 550 X 88 FD	850 2150	1/ Construction, conversion and repairs - all types of vessels. 2/ 6,680
Bethlehem Steel Corp. Sparrows Point Yard Sparrows Point, MD 21219	800 X 106 SW 800 X 95 SW 1200 X 192 GD	1260 3970	1/ Construction and conversion - all types of vessels. 2/ 1,290
General Dynamics Electric Boat Division Eastern Point Road Groton, CT 06340	See 1/	750 3506	1/ Engaged exclusively in construction of submarines for the U.S. Navy. 2/ 24,527
Newport News Shipbuilding & Drydock Company 4101 Washington Avenue Newport News, VA 23607	447 X 93 SW 668 X 93 SW 958 X 121 GD * 1100 X 136 GD * 646 X 88 GD ** 858 X 102 GD ** 455 X 68 GD ** 521 X 68 GD ** 1609 X 246 GD *	1370 12000	1/ Construction, conversion and repairs - all types of vessels. 2/ 28,500 * Used for construction. ** Used for repair and overhaul.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Shipbuilding Yards			
Norfolk Shipbuilding & Drydock Corporation P.O. Box 2100 Foot of Liberty Street Norfolk, VA 23501	475 X 85 SW 750 X 90 FD 1000 X 155 FD 441 X 60 MR *	1030 12170	1/ Ship construction, conversion and repairs - all types of vessels. 2/ 3,200 * Located at Brambleton plant.
Pennsylvania Shipbuilding Co. P.O. Box 498 Chester, PA 19013	(2) 745 X 129 SW 720 X 195 LL 1100 X 195 LL 1100 X 195 FD 400 X 84 FD	1100 6200	1/ Ship construction, conversion and repair - all types of vessels. 2/ 1,200
Robert E. Derecktor of Rhode Island, Inc. Coddington Cove Middleton, RI 02840	725 X 90 FD 500 X 90 LL	1525 6500	1/ Construction of Coast Guard ships and vessel repairs. 2/ 698

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA--Beam) SW--Shipway GD--Graving Drydock FD--Floating Drydock MR--Marine Railway LL--Land Level Position SL--Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Repair Yards with Drydock Facilities			
Atlantic Drydock Corp. 8503 McKenna Rd. Fort George Island, FL 32226	450 X 76 MR	585 1440	1/ Construction of small vessels. Repair and overhaul of small and medium size vessels. 2/ 320
Bath Iron Works Corp. Commercial & Franklin Sts. Portland, ME 04101	1000 X 136 FD	1000 1500	1/ Ship repairs and conversion. 2/ 574
Boston Marine Industrial Park (E.D.I.C.) 18 Tremont Street Suite 300 Boston, MA 02108	1150 X 120 GD	900 2500	1/ Leases public drydock in former Boston Naval Annex to local ship repair companies. 2/ 20
Braswell Shipyards 3 Braswell St. Charleston, SC 29405	570 X 92 FD	720 1080	1/ Ship repairs and conversion. 2/ 185
Colonna's Shipyard, Inc. 400 E. Indian River Rd. Norfolk, VA 23523	(2) 400 X 65 MR	900 2230	1/ General ship repairs. 2/ 250
Detyens Shipyard Rt. 2, Box 180 Mt. Pleasant, SC 29464	500 X 85 FD	510 1022	1/ General ship repair and conversion. 2/ 365

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Repair Yards with Drydock Facilities			
General Ship Corp. 400 Border Street East Boston, MA 02128	678 X 90 GD *	900 2530	1/ Ship repairs, overhauls and modernizations. 2/ 326 * GD is long-term leased from Boston Marine Industrial Park in the former Boston Naval Annex.
Hoboken Shipyards, Inc. P.O. Box 1159 Bayonne, NJ 07002-6159	1082 X 138 GD *	650 2250	1/ Ship repairs, overhaul and conversion. 2/ 160 * Long-term leased from Army Corps of Engineers.
Jacksonville Shipyards Commercial Division P.O. Box 2347 Jacksonville, FL 32203	660 X 90 FD 900 X 140 FD 745 X 127 FD	800 4187	1/ Ship repair and conversion. 2/ 1,200
Jacksonville Shipyards Bellinger Division 13911 Atlantic Blvd. Jacksonville, FL 32211	400 X 53 FD 400 X 50 SW 475 X 70 SW	600 2297	1/ Construction and repair of small vessels. 2/ 300
Metro Machine Corp. P.O. Box 1860 Norfolk, VA 23501	675 X 96 FD	785 2030	1/ Ship repairs and conversion. 2/ 540

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Repair Yards with Drydock Facilities			
New York Shipyard Corp. One Beard St. Brooklyn, NY 14231	686 X 86 GD 710 X 109 FD 475 X 80 FD 775 X 106 FD	1152 4047	1/ General ship repairs. 2/ 179
North Florida Shipyards P.O. Box 3255 Jacksonville, FL 32206	500 X 66 FD	1600 3390	1/ Ship repairs and conversion. 2/ 352
Perth Amboy Drydock Co. Foot of Commerce St. P.O. Box 348 Perth Amboy, NJ 08862	400 X 68 FD 443 X 70 FD 545 X 90 FD	600 2180	1/ General ship repair and conversion. 2/ 102

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Types of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Topside Repair Yards			
Associated Naval - Architects 3400 Shipwright Street Portsmouth, VA 23703		400 1390	1/ General ship repair and overhaul. 2/ 93
Caddell Drydock & Repair Company P.O. Box 327 Staten Island, NY 10310		666 2802	1/ General ship repair. 2/ 151
Delta Marine, Inc. P.O. Box 2191 Wilmington, NC 28402		1000 1650	1/ General ship repair. 2/ 52
Eastern Technical Enterprises, Inc. 2429 Ferry Rd. Virginia Beach, VA 23455		600 600	1/ Ship repair, overhaul, and modification. 2/ 55
General Ship Repair Corp. 1449 Key Highway Baltimore, MD 21230		435 845	1/ General ship repair. 2/ 63
Jonathan Corporation Little Creek Shipyard Virginia Beach, VA 23455		558 1116	1/ General ship repair, particularly naval vessels. 2/ 200
Jonathan Corporation 701 Front Street Norfolk, VA 23510		775 1181	1/ Ship repair and overhaul. 2/ 560

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400′ in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest / Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Topside Repair Yards			
Marine Hydraulics International 800 East Indian River Rd. Norfolk, VA 23523		650/2150	1/ General ship repair. 2/ 136
Melville Marine Industries P.O. Box 42 Portsmouth, RI 02871		1200/1200	1/ General ship repair. 2/ 79
Metal Trades, Inc. P.O. Box 129 Hollywood, SC 29449-0129		260 * / 500	1/ General ship repair. 2/ 260 * Can do topside repair to vessel 400′ in length.
Moon Engineering 545 Front Street Norfolk, VA 23510		550/550	1/ General ship repair, primarily for Navy. 2/ 85
Moon Engineering Two Harper Avenue Portsmouth, VA 23707		613/1226	1/ General ship repairs. 2/ 130
M & W Marine Service, Inc. 601 Jefferson Ave. Newport News, VA 23607-6113		600/600	1/ General ship repair. 2/ 78
Newport Offshore, Ltd. One Washington Street Newport, RI 02840		3000/8300	1/ General ship repair. 2/ 85

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
EAST COAST Topside Repair Yards			
Promet Marine Services Corp. 242 Allens Ave. E. Providence, RI 02905		750 2250	1/ General ship repair. 2/ 25
Reynolds Shipyard Corp. 200 Edgewater Street Staten Island, NY 10305		440 440	1/ General ship repairs. 2/ 37
Tracor Marine, Inc. P.O. Box 13107 Port Everglades, FL 33316		780 1305	1/ General ship repairs. 2/ 340

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400′ in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in. 2/ Employment - Mid-1986
GULF COAST Shipbuilding Yards			
ADDSCO Industries, Inc. P.O. Box 190 Mobile, AL 36601	(4) 523 X 90 SW 620 X 105 SW 625 X 83 FD 750 X 100 FD	1132 9370	1/ Ship construction, conversion and repairs. Also drill rig construction. 2/ 950
Avondale Industries, Inc. P.O. Box 50280 New Orleans, LA 70150-0280	(2) 1020 X 175 LL * 1000 X 216 FD * 750 X 110 FD ** (3) 1200 X 126 LL ** 450 X 90 SW ***	2300 6100	1/ Modular ship construction, conversion, and repairs - all types of vessels. 2/ 5,600 * Upper main yard. ** Lower main yard. *** Westwego Plant.
Bethlehem Steel Corp. Beaumont Yard P.O. Box 3031 Beaumont, TX 77704	960 X 105 SW	1100 3450	1/ Construction of barges and drilling rigs. Also ship repair and conversion. 2/ 150
Litton/Ingalls Shipbuilding Division P.O. Box 149 Pascagoula, MS 39568-0149	690 X 85 SW 550 X 80 SW (4) 650 X 90 SW 460 X 60 GD 850 X 173 FD * (5) 844 X 260 LL * 1540 X 180 LL *	2650 9850	1/ Construction, conversion, and repairs - all types of vessels. 2/ 12,700 * West Bank can only launch ships up to 850′ X 173′. Land Level Positions constrained by launching capability.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest / Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
GULF COAST Shipbuilding Yards			
Marathon LeTourneau Co. P.O. Box 3189 Brownsville, TX 78520	1100 X 150 SW	500 / 2100	1/ Construction of drillings rigs. Yard has capability of building large oceangoing ships. 2/ 500
Tampa Shipyards, Inc. P.O. Box 1277 Tampa, FL 33601	546 X 72 GD* 896 X 146 GD* (2) 746 X 121 GD**	840 / 2240	1/ Ship construction, conversion and repairs. 2/ 330 * Used for ship repair. ** Used for ship construction.
Todd Shipyards Corp. Galveston Division P.O. Box 1550 Galveston, TX 77553	475 X 85 SW 900 X 160 FD 600 X 118 FD	1086 / 6400	1/ Ship construction, repairs and conversion. 2/ 800

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
GULF COAST Repair Yards with Drydock Facilities			
Bender Shipbuilding & Repair Co., Inc. 265 South Water Street Mobile, AL 36601	660 X 89 FD 414 X 55 FD 414 X 45 FD	617 5000	1/ Construction of vessels up to 300' in length. Also repairs and conversion. 2/ 485
Bethlehem Steel Corp. Sabine Yard P.O. Box 1448 Port Arthur, TX 77641	950 X 118 FD	900 1900	1/ Repair of offshore oil rigs but can repair oceangoing ships. 2/ 100
Bludworth Bond Shipyard P.O. Box 5065 Houston, TX 77262	435 X 80 FD	530 1500	1/ General ship repairs. 2/ 95
Gulf-Tampa Drydock Co. 1200 Sertoma Drive Tampa, FL 36605	500 X 97 FD	800 1100	1/ Ship repairs and overhaul. 2/ 220

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
GULF COAST Topside Repair Yards			
American Marine Corp. 3900 Jordan Rd. New Orleans, LA 70182		800 800	1/ Construction of offshore oil vessels and barges. 2/ 150
Boland Marine Manufacturing P.O. Box 53287 New Orleans, LA 70153		3600 4702	1/ General ship repairs. 2/ 85
Buck Kreihs Co. P.O. Box 53305 2225 Tchoupitoulas St. New Orleans, LA 70150		1120 1120	1/ Ship repairs and conversion. 2/ 95
Coastal Iron Works P.O. Box 2548 1133 E. Port Ave. Corpus Christie, TX 78403		290 * 470	1/ General ship repair. 2/ 85 * Can do topside repair to vessels 400' in length.
Dixie Machine Welding P.O. Box 53355 New Orleans, LA 70153		1333 1333	1/ General ship repairs. 2/ 245
Halter Marine, Inc. Equitable Division P.O. Box 8001 New Orleans, LA 70182		400 1318	1/ Construction and repair of small vessels and barges. 2/ 98

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
GULF COAST Topside Repair Yards			
Hendry Corp. P.O. Box 13288 5107 S. Westshore Blvd. Tampa, FL 33611		1000 1000	1/ General ship repairs. 2/ 112
Houston Ship Repair, Inc. 16201 Wood Drive Houston, TX 77530		750 750	1/ General ship repair and conversion. 2/ 120
McDermott Shipyard P.O. Box 588 Morgan City, LA 70340		600 1190	1/ Construction and repair of tugs, supply boats, barges, and drill rigs. 2/ 700
Newpark Shipbuilding P.O. Box 5426 Houston, TX 77012		500 1600	1/ Small vessel construction and repairs. 2/ 190

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
WEST COAST Shipbuilding Yards			
Lockheed Shipbuilding Co. 2929 16th Ave., S.W. Seattle, WA 98134	(2) 650 X 90 SW 690 X 90 SW 643 X 96 FD	698 6500	1/ Ship construction, conversion and repair - all types of vessels. 2/ 1,450
Marine Power & Equipment Yard No. 4 6701 Fox Avenue S. Seattle, WA 98108	400 X 57 FD (2) 500 X 104 SW 400 X 100 SL	620 1505	1/ Ship construction, repairs, and conversion. 2/ 100
National Steel & Shipbuilding Co. Harbor Drive & 28th St. P.O. Box 85278 San Diego, CA 92138	690 X 90 SW (2) 900 X 106 SW 980 X 170 GD 750 X 130 FD	1000 7250	1/ Construction, conversion, and repairs - all types of vessels. 2/ 3,920 Graving dock and piers at U.S. Naval Station also leased, as required.
Portland Ship Repair Yard 5555 N. Channel Avenue P.O. Box 3529 Portland, OR 97208 Facilities also leased by: 1. Dillingham Ship Repair 2. Northwest Marine Iron 3. Lockport Marine Co.	475 X 100 LL 810 X 108 LL 650 X 84 FD 550 X 88 FD 810 X 108 FD 1150 X 181 FD	1000 10200	1/ Ship construction, repair and conversion - all types of vessels. 2/ 3,135
Tacoma Boatbuilding 1840 Marine View Drive Tacoma, WA 98422	(2) 425 X 45 SW (2) 430 X 50 SW 650 X 400 SW 420 X 64 FD	680 4200	1/ Ship construction, repairs, and conversion - all types of vessels. 2/ 550

BEST COPY AVAILABLE

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
WEST COAST Shipbuilding Yards			
Todd Pacific Shipyards Los Angeles Division 710 Front Street San Pedro, CA 90733	(2) 725 X 87 SW 826 X 147 LL 545 X 116 LL 711 X 86 FD 655 X 106 SL	700 6175	1/ Modular ship construction, conversion, and repairs - all types of vessels. 2/ 2,640
Todd Pacific Shipyards Seattle Division 1801-16th Avenue, S.W. Seattle, WA 98124	600 X 96 SW * 420 X 62 FD 650 X 84 FD 943 X 133 FD	1400 6017	1/ Ship construction, repairs, and conversion - all types of vessels. 2/ 850 * Max. ship size is 600' X 96' using two 450' X 50' SWs.
Todd Shipyards Corp. San Francisco Division 20th & Illinois Streets San Francisco, CA 94107	550 X 90 SW 700 X 95 FD 950 X 144 FD	800 3385	1/ Barge construction, ship repairs and conversion. Can Build C3 and C4 type vessels. 2/ 450

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
WEST COAST Repair Yards with Drydock Facilities			
AK-WA, Inc. 1203 E. D Street Tacoma, WA 98421	516 X 86 FD	600 3000	1/ Ship repair and conversion. 2/ 300
Continental Maritime of San Francisco, Inc. Pier 50-54 San Francisco, CA 94107	750 X 134 FD	1100 4100 *	1/ Ship repair and conversion. 2/ 470 * Pier space long-term leased from San Francisco Port Commission.
Hunters Point Naval Shipyard San Francisco, CA 94124	705 X 82 GD 986 X 108 GD 1088 X 138 GD (2) 416 X 56 GD 416 X 71 GD	1390 24000	1/ Ship repairs, overhaul, and conversion. 2/ N/A Facilities leased to private ship repair firms on an as-needed basis.
Marine Power & Equipment Yard No. 1 1441 N. Northlake Drive N. Seattle, WA 98103	400 X 60 FD	360 510	1/ General ship repairs. 2/ 120
Pacific Drydock & Repair Co. 321 & 1441 Embarcadero Oakland, CA 94606	400 X 52 FD	600 1155	1/ Ship and barge repairs. 2/ 100

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
WEST COAST Repair Yards with Drydock Facilities			
Southwest Marine, Inc. P.O. Box 13308 Foot of Sampson St. San Diego, CA 92113-0308	655 X 104 FD	700 2422	1/ Ship repairs, overhaul, and conversion. 2/ 520 Graving dock at Naval Station can be leased as required.
Southwest Marine, Inc. Terminal Island 985 S. Seaside San Pedro, CA 90731-7331	720 X 93 FD	1500 4175	1/ Ship repairs, overhaul, and conversion. 2/ 504
Southwest Marine of San Francisco P.O. Box 7644 (Pier 38) San Francisco, CA 94120-7644	400 X 54 FD	700 1500	1/ Ship repairs and overhaul. 2/ 206
U.S. Naval Station P.O. Box 119 San Diego, CA 92136	687 X 85 GD	N.A. 13000	1/ Facilities leased to following ship repair companies as well as others previously noted: a/ Arcwel Corporation b/ Continental Maritime of San Diego c/ RMI, Inc. 2/ N/A

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Useable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
WEST COAST Topside Repair Yards			
Billfish, Inc. Berth 44, Outer Harbor San Pedro, CA 90731		620 620	1/ General ship repair. 2/ 92
Campbell Industries P.O. Box 1870 501 E. Harbor Drive San Diego, CA 92112		640 2185	1/ General ship repair and construction of vessels up to 300' in length. 2/ 114
Fishermen's Boat Shop 1016 14th Street Everett, WA 98201		1500 1500	1/ General ship repair and modifications. 2/ 41
Foss Shipyard 660 West Ewing Street Seattle, WA 98119		460 2575	1/ Vessel repair, alteration, and overhaul. 2/ 98
Lake Union Drydock 1515 Fairview Avenue East Seattle, WA 98102		1000 4235	1/ Ship repair and conversion. 2/ 75
Larson Boat Shop 1046 S. Seaside Ave. Terminal Island, CA 90731		400 600	1/ Ship and boat repair. 2/ 100

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest / Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
WEST COAST Topside Repair Yards			
Pacific Fishermen, Inc. 5351 24th Avenue Seattle, WA 98107		500 1300	1/ Construction and repair of small vessels. Topside repair of large vessels. 2/ 80
Service Engineering Co. P.O. Box 7714 San Francisco, CA 94120		906 1812	1/ General ship repair and conversion. 2/ 126

BEST COPY AVAILABLE

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
GREAT LAKES Maximum ship size that can exit the St. Lawrence Seaway locks is 730' X 78'.)			
Shipbuilding Yards			
Bay Shipbuilding Corp. 605 North Third Ave. Sturgeon Bay, WI 54235	730 X 105 SW 640 X 68 FD 1100 X 136 GD	1000 7095	1/ Ship construction, repairs, and conversion. 2/ 1,500
Fraser Shipyards P.O. Box 997 Superior, WI 54880	825 X 82 GD 620 X 61 GD	900 4450	1/ Ship construction, repairs, and conversion. 2/ 80
The Toledo Shipyard * 3135 Front Street Toledo, OH 43605	540 X 68 GD 680 X 78 GD	800 1610	1/ Ship construction, repair, and conversion. 2/ 150 * Leased by Merce Industries, Inc.
Repair Yards with Drydock Facilities NONE			
Topside Repair Yards Marinette Marine Corp. Foot of Ely Street Marinette, WI 54143		2136 2136	1/ Ship construction, repair, and conversion. 2/ 689

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986

GREAT LAKES

Maximum ship size that can exit the St. Lawrence Seaway locks is 730' X 78'.)

Topside Repair Yards Peterson Builders 101 Pennsylvania St. P.O. Box 47 Sturgeon Bay, WI 54235-0047		900 2515	1/ Ship construction, repair, and conversion. 2/ 976
WEDTECH of Michigan, Inc. 400 Lake Street Ontonagon, MI 49953		610 610	1/ Construction and repair of integrated tug barges. 2/ 230

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES
(Vessels 400' in Length and Over)

Name and Address	Maximum Ship Size (LOA—Beam) SW—Shipway GD—Graving Drydock FD—Floating Drydock MR—Marine Railway LL—Land Level Position SL—Syncrolift	Berths/Piers Usable Length in feet Longest Total linear feet	Remarks 1/ Type of work usually engaged in 2/ Employment - Mid-1986
NON-CONUS Shipbuilding Yards NONE			
Repair Yards with Drydock Facilities			
Honolulu Shipyard, Inc. P.O. Box 30989 Honolulu, HI 96820	400 X 54 FD	600 600	1/ General ship repair and overhaul. 2/ 190
Marisco, Ltd. 607 Ala Moana Blvd. Honolulu, HI 96813	500 X 76 FD	*	1/ General ship repair 2/ 55 * Leased from Port Commission.
Puerto Rico Drydock & Marine Terminals P.O. Box 2209 San Juan, PR 00903	632 X 80 GD	1000 3300	1/ General ship repairs. 2/ 200
Topside Repair Yards NONE			